
The Effects of Lymphatic Filariasis on Human Health: An Empirical Survey of the Preventive and Treatment Measures of the Disease among Adults in Eastern Obolo Local Government Area

BY

Grace Joe EKA
Department of Human Kinetics and Health Science
Faculty of Education
Nnamdi Azikiwe University
Awka – Anambra State, Nigeria

ABSTRACT

This study was to assess the effects of lymphatic filariasis on human health: an empirical survey of the preventive and treatment measures of the disease among adults in Eastern Obolo Local Government Area. The research design adopted for the study was a descriptive survey design. The study area was Eastern Obolo with its headquarters at Okoroete. The population for the study is 75,000 adults comprising 36,600 males and 38,400 females representing 48.8 percent males and 51.2 percent females respectively. The target population for this study was all adults of both sexes of about 20 years and above in Emereoke and Okoroete community of Eastern Obolo. Akwa Ibom State, Nigeria. A stratified random sampling method was used to sample out the subset of population A and B which represent the two communities in Eastern Obolo Local Government Area. A total of one hundred and twenty (120) respondents was the sample size for the study. The main instrument used for data collection was the structured questionnaire captioned lymphatic filariasis and Human Health Questionnaire (LFHHQ). Data were collated, coded, entered and analyzed using statistical package for social science (SPSS version 2.0) SPSS was used because; it was fast and flexible and provides more accurate analysis resulting in dependable conclusions. Based on the findings, it was concluded that effects of the disease were equally identified by the respondents which included mark, financial burden and loss of efficiency. Based on the findings, one of the recommendations was that government should develop a policy for filariasis endemic zone to test every patient who present with malaria bite and symptom for lymphatic filariasis. The testing facilities should also be expanded to include health centres and the dispensary level to reduce cases of delayed diagnosis in the area.

KEYWORDS: Lymphatic filariasis, health of individuals, preventive measures, Health Belief Model (HBM), Epidemiology, Treatment and Control

Introduction

In the tropics, the geographic distribution of *Wuchereria Bancrofti* and *Brugia Malayi* infection is expanding due to increased numbers of breeding sites that appear when large numbers of people migrate from rural or urban areas (WHO, 2002). According to Nkrumah (2006), the pessimistic epidemiological trend contrast with the recent gains and successes by global programme to eliminate lymphatic filariasis using yearly single dose administration of antifilarial chemotherapy. This mosquito transmitted infection occurs throughout the tropics but

highly heterogeneous in the distribution, infecting high proportion of people in some communities and few in others. The parasite can persist for years in human and consequently the burden of disease occurs in adults (centre for Disease Control, (2010).

According to Nutman, (2011) nematode live in human lymphatics resulting in lymphatic damage and dysfunction that result to recurrent swelling and disfigurement of the limbs (elephantiasis), genitalia in male and sometime breast in women. Occasionally infected individual may develop a retrograde lymphadenitis and lymphangitis. Historically, lymphatic filariasis has been known to occur in the Nile region, and ancient artifacts suggests that the disease may have been present as early as 200 BC, Actually the first reliable documentation of lymphatic filariasis symptoms do not occur until exploration of Goa between 1588 and 1592. The most important discovery related to filariasis was that made by Patric Manson in 1877. Manson was the first to look for an intermediate host for lymphatic filariasis microfilariae in 1877. He was finally able to pinpoint the microfilariae in mosquitoes. This discovery was later applied to other tropical diseases such as malaria and this was the first discovery of an arthropod as a vector. Soon after the discovery of microfilariae, the adult worm was documented by Joseph Bancroft, the observed species was later named after Bancroft and now recognized it as *wuchereria bancrofti*. Descriptions of elephantiasis were found in early Indian, Egyptian and Persian-region. Epidemiological association of elephantiasis with hydrocele, chylocele and chyluria were established in the middle of 19th century. Their common etiology however remains a mystery until discoveries were made of microfilariae hydrocele fluid. The described of microfilaria by culex mosquitoes and their maturation to infective form. This was the first description of the mosquito as a vector for any of the parasitic diseases which paved way to his discovery of malaria transmission.

Statement of the problem

The painful and profoundly disfiguring visible manifestations of the disease are lymphoedema, elephantiasis and scrotal swelling which occur late in men and can lead to permanent disabilities. These patients are not only physically disabled but suffer mental, social and financial losses contributing to stigma and poverty. Based on preliminary investigation, majority of people misunderstand lymphatic filariasis as a disease caused by charm. Knowledge about mosquito as the causative agent of lymphatic are not established among Eastern Obolo people. This motivated the interest of the researcher to undergo the study on this disease so as to educate the people on the causes, mode of transmission, prevention and treatment of lymphatic filariasis. It may as well involve environmental sanitation, vector control and use of chemoprophylaxis to the affected communities in Eastern Obolo. According to WHO (2000) adult worms lodge in the lymphatic vessels and disrupt the normal functioning of the lymphatic system. The worm can live for approximately 8 years and during their life time and produce millions of microfilaria (immature larvae) that circulates in the blood.

Purpose of the Study

1. To examine the effects of lymphatic filariasis on the health of individuals
2. Find out the preventive and treatment measures of lymphatic filariasis

Research Questions

1. What are the effects of lymphatic filariasis on the health of individuals?
2. What are the preventive and treatment measures of lymphatic filariasis?

Hypotheses

1. There is no significant difference between the people's level of knowledge and the effects of lymphatic filariasis on their physical appearance.
2. Use of modern medicine for treatment of lymphatic filariasis does not significantly influence the level of knowledge of the people in Okorette and Emeroke community.

The Health Belief Model (HBM)

According to Becker (1974), The HBM was developed in the early 1950s by a group of social psychologists at U.S public health services in an attempt to understand the widespread failure of people to accept disease preventive or screening tests for the early detection of asymptomatic disease (Rosenstock, 1974). It was later applied to patient's responses to symptoms (Kirscht, 1974) and compliance with prescribed medical regimen. The model has also been used to predict behaviour of both acute and chronically-ill patients. The likelihood of an individual undertaking a particular action is seen as a function of the individual perception of their susceptibility to the illness. The seriousness of the illness and the potential benefits and costs involve in undertaking the particular action.

The Relevance of this Theory to the Study

According to Cumhance (2010) the perceptions of the people, which is their belief, attitude and knowledge of lymphatic filariasis affect people. Few interpret and experience the disease according to their social context. The perception of the disease depends on the culture and the environment in which they live and also affect the definition of the disease and how the categorize it. The way in which people classify disease is influenced by their own observation and understanding of the disease process. The meanings and notions of causality as provided by culture will determine the roles which people play with regards to the illness. A person can be ill without a corresponding disease and decide not to take up the sick role in the society (Kalage, 2009).

The Effects of Lymphatic Filariasis on People of Okorote/Emeroke

Lymphatic filariasis is a neglected tropical disease. Infection occurs when filarial parasites are transmitted to humans through mosquitoes. Infection is usually acquired in childhood causing hidden damage to the lymphatic system. The painful and profoundly disfiguring visible manifestations of the disease, lymphoedema, elephantiasis and scrotal swelling occur later in life and can result to permanent disability

Hydrocele, an accumulation of fluid in the scrotum that causes it to swell, is one of the chronic manifestation of filariasis among men and there are 26.9 million cases of hydrocele worldwide (WHO, 2012). Researcher pre-interaction with patients, their wives and community members during this studies revealed several problems related to marriage and sex due to hydrocele. Many

patients reported a feeling of shame and embarrassment and others reported pains on the scrotum during intercourse. Some patients as well as their wives desire surgery to remove the hydrocele (hydrocelectomy). Sexual dissatisfaction, physical and economic burdens of hydrocele were seen to contribute to lack of happiness and communication among couple. Furthermore, some women in the community said that affected men are generally seen as the last choice for marriage.

According to Center for Disease Control (2012), estimation of socio-economic burden of the lymphatic filariasis is important not only to understand the effect on individual patient and their families but also for providing information crucial for developing materials for mobilization of resource and commitment for its control. Norris (2012) suggested that the effect of lymphatic filariasis was tremendous. Patients who were heavily infected with lymphatic filariasis had a high risk of developing chronic symptoms, including lymphodema and elephantiasis. Such symptoms could result in a decreased productivity, as they can lead to life threatening infections if not properly cared for, as well as mobility and functionality problems. It is estimated that India alone lost an average of \$1 billion per year to lymphatic filariasis because of treatment costs and decreased productivity. Morris (2012) asserted that perception upon disease by various agencies is usually based on the market value of any investment for the disease and possible returns. Some religion of the world that can afford medicine mainly consisting of developed nation such as United States and Europe generally represent the market of individual who can pay for the therapy. In contrast, there are so many types of diseases prevalence in the developing countries and causing suffering to humanity in a higher extent in a way the people cannot afford.

Epidemiology

Lymphatic filariasis affect over 120 million people in 80 countries throughout the tropics and sub-tropics of Asia, Africa, the Western Pacific and part of the Caribbean and South America (Wynd, 2007). According to WHO (2012), nocturnal periodic wuchereria bancrofti is endemic in tropical America, Caribbean, Africa, Egypt, the Middle East, India, South East Asia, Southern and Eastern China.

The nocturnal periodic variant of wuchereria bancrofti is round mainly in the Eastern pacific (Indonesia). The nocturnal sub-periodic variant is found especially in Thailand and Vietnam. Wuchereria bancrofti is found with Brugia Malayi in parts of South East Asia and South India, (CDC,2010). Periodic Brugian Malayi is commonly found in open swamps and rice-growing areas of coastal regions, the sub periodic variant is found mostly in fresh water and in swamps in forest along Major River. Brugian timori shows a nocturnal periodicity. It is found only in the Lesser Sunda Islands of Indonesia. The species take its name from island of Timor which forms part of the group. It is found in low lying riverine and coastal areas.

Life Cycle of Lymphatic Filariasis

Development of the larvae takes place in the lymphatics. Within 3-15 months, the larvae become mature male and female worms. The females produce many sheathed microfilariae which can be found in the blood about 9 months after infection for wuchereria bancrofti and about 3 months for Brugia species. The mature worms can live for many years in their host depending on the body and the extent of the host's immune response. Their mean lifespan is 4-6 years but they can survive up to 15 years or more in human beings. The microfilariae are taken up by a mosquito vector when it sucks human blood (microfilariae which are not ingested die within 6-24 months).

In the stomach of the mosquito, the microfilariae lose their sheath and migrate from the midgut to the thorax of the vector where they develop into mature infective larvae. Development in the mosquito takes 1-2 weeks. Mature infective larvae migrate to the mouth parts of the mosquito ready to be transmitted when it takes next blood meal.

Treatment and Control

Palliative Treatment

Pathological symptoms may be treated at early stages. There is no drug which can reduce grotesque swelling. Reports are available that Diethylcarbamazine (DEC) with coumarin can reduce pathological swelling up to some extent. Repeated cleaning of the affected portion with soap and water and application of antibiotic antifungal cream have dramatic effect on the elephantoid limb. To promote lymph flow keeping nail clean and wear shoes. Using local antiseptic or antibiotics creams to treat small wounds or abrasions are the palliative treatment.

Diethylcarbamazine (DEC)

This drug is effective against both microfilariae and adult worm. DEC markedly lowers the blood microfilariae levels even in single annual dose of 6mg/6g and this effect is sustained after one year. Even though DEC kills the adult worms, this effect is only observed in 50 percent of patients. This drug does not act directly on the parasite but its action is mediated through the immune system of the host. The sustained destruction of microfilariae by this drug even in annual single doses makes it a good tool to prevent the transmission of this disease. The adverse effects produced by the drug are mostly observed in patient who have microfilariae in their blood and are due to their rapid destruction which are characterized by fever, headache, myalgia, sore throat or cough lasting for 24 to 48 hrs (Andrade, 2004). DEC is the drug of choice in the treatment of tropical eosinophilia syndrome in which it should be given for lower period of 3 to 4 weeks.

Ivermectin (IVM)

This drug acts directly on the microfilariae and in single doses of 200 to 400 mg/kg. it keeps the blood microfilariae count at very low levels even after one year. Like DEC, the adverse effects noticed in microfilariaemic patient are similar to those produced by DEC but are milder due to the slower clearance of the parasitemia. IVM has no proven action against the adult parasite or in tropical species (Dreyer, 2008). Ivermectin is the drug of choice for the treatment of onchocerciasis because of its safety and efficacy, when compared to DEC.

Albendazole (ALB)

This anti-helminthic drug is shown to destroy the adult filarial worms when given in doses of 400mg twice a day for two weeks. The death of the adult worm induces severe scrotal reactions in bancroftian filariasis since this is the common site where they are lodged. ALB has no direct action against the microfilariae and does not immediately lower the microfilariae counts. When given in single dose of 400mg in association with DEC or IVM, the destruction of microfilariae

by these drugs become more pronounced. ALB combined with DEC or ivermectin is recommended in the global filariasis elimination programme.

Combination Therapy

According to Olsen (2007) the above drugs have also been studied for possible synergistic effects by co-administration of the standard drugs like ALB+IVM, ALB+DEC, ALB+DEC+IVM or DEC+IVM in various population. The strategy that appeared most suitable for the elimination of filariasis in India is the administration of a single annual dose of ALB 400mg along with DEC 6mg/kg of body weight. This does not only prevent transmission of filariasis in the community by reducing the levels but also has the added benefit of clearing the intestinal helminthes (Shenoy, 2000). Results with ALB added to single drug therapy with IVM or DEC against lymphatic filariasis were inconclusive, but DEC and IVM in combination appeared to be superior to DEC or IVM alone. None of the drug combinations against lymphatic filariasis showed more adverse reactions than single-drug therapy.

Vector Control

This is the primary tool for controlling filariasis in several part of the world (Burkot, 2007). Covering water storage containers and improving waste-water and solid waste treatment systems can help in reducing the amount of standing water in which mosquitoes can lay eggs, in addition, killing eggs (ovicidal) and killing or disrupting larva (larvicidal) in bodies of stagnant water can further reduce mosquito population.

Foot-Care Programme

Some result studies have shown that with proper local care of the affected limb, these acute adeno-lymphangitis attacks can be prevented even in case of severe lymphoedema. This foot-care programme involves washing of the affected areas, especially the webs of the toes and deep folds of skin, with soap and water twice a day or at least once before going to bed and wiping dry with a clean cloth to avoid moisture; clipping the nails at intervals and avoiding local injuries or infections using antibiotic ointment. Regular use of properly fitting foot wear; raising the affected limb at night in order to reduce the swelling; to prevent repeated acute adeno-lymphangitis in such patients, administration of long term antibiotic therapy with oral penicillin or long acting parenteral benzathine penicillin (Palumbo, 2008).

Once lymphoedema is established there is no cure. However, the following treatment offer relief and may prevent further progression of the swelling; using elastic bandage or tailor made stocking while ambulant; keeping the limb elevated at night or while resting after removing the bandage; regular exercise of the affected limb; regular light massage of the lymphatic and to promote flow of lymph towards larger patent vessel; intermittent pneumatic compression of the affected limb using single or multicell jacket, heat therapy either using wet heat or hot oven; surgical procedures such as lymph nodeovenous shunts, omentoplasty, excisional surgery, skin grafting; prolonged treatment with oral or topical coumarin or flavonoid is considered to be effective in reducing the lymphoedema (Palumbo, 2008).

WHO's Response

World Health Assembly Resolution encouraged member state to eliminate lymphatic filariasis as a public Health problem (WHO, 2002). In response, WHO launched its Global Programme to Eliminate Lymphatic Filariasis (GPELF) in 2000. The goal of the GPELF was to eliminate lymphatic filariasis as a public health problem by 2020 (Njenga, Mwandawiro, Wamae, and Mukoko, 2011). The strategy was based on two key components:

- ❖ Interrupting transmission through annual large scale treatment programmes known as mass drug administration, implemented to cover the entire “at risk” population.
- ❖ Alleviating the suffering caused by lymphatic filariasis through morbidity management and disability prevention.

Mass Drug Administration (MDA)

To achieve interruption of transmission, first the disease in endemic communities is mapped to know where to administer MDA. This is then followed by administration of single of albendazole plus either diethylcarbamazine or ivermectin to the entire risk population. MDA should be continued for 4-6 years to fully interrupt transmission of infection by 2020. (WHO, 2011), 59 endemic countries were mapped, and 53 countries had started implementing MDA. About the 53 countries that had implemented MDA, 37 countries had already completed five or more round of MDA in at least some of their endemic area. From 2000 to 2010, more than 3.4 billion treatments were delivered to a target population of about 900 million individuals in 53 countries. This has led to considerable reduction of transmission in many places (WHO, 2011).

Methodology

The research design adopted by the researcher was the descriptive survey design. The study area is Eastern Obolo with its headquarters at Okoroete. The target population for this study is all adults of both sexes of about 20 years and above in Emereoke and Okoroete community of Eastern Obolo. Akwa Ibom State, Nigeria. The researcher used the stratified random sampling method to sample out the subset of population A and population B which represent the two communities in Eastern Obolo Local Government Area. A total of one hundred and twenty (120) respondents were the sample size for the study in the communities. The main instrument used for data collection was the structured questionnaire as approved by the research supervisor. It was titled the effects of lymphatic filariasis on human health: an empirical survey of the preventive and treatment measures of the disease among adults in Eastern Obolo Local Government Area. Questionnaire captioned *lymphatic filariasis and Human Health Questionnaire (LFHHQ)* was used for the study. Data were collated, coded, entered and analyzed using version 20 of statistical package for social sciences (SPSS). The package was used because it was fast and flexible as well as providing more accurate analysis resulting in dependable conclusions.

Research Question 1

Physical and social effects of lymphatic filariasis were assessed through physical examination and with the used of structured questionnaire. The following physical effects were identified as

an effect which posed serious threat to health and wellbeing of people infected with the debilitating disease. This included financial disability, disfigurement of the affected limbs and stigma, among others. Majority of the patient infected with lymphatic filariasis experienced numerous negative effects ranging from stigma, isolation, abandonment by their relative and even divorce by their spouses. The marriage ability of people infected with lymphatic filariasis was further assessed using structured questionnaire. Out of 120 respondents who answered this questions, 62 (51.7%) accepted that marrying infected person is a taboo, 54 (45%) did not accept the motion while 4 (3.3%) did not indicate their opinion whether yes or no option. (See table 1).

Table 1: Marrying infected persons is a taboo

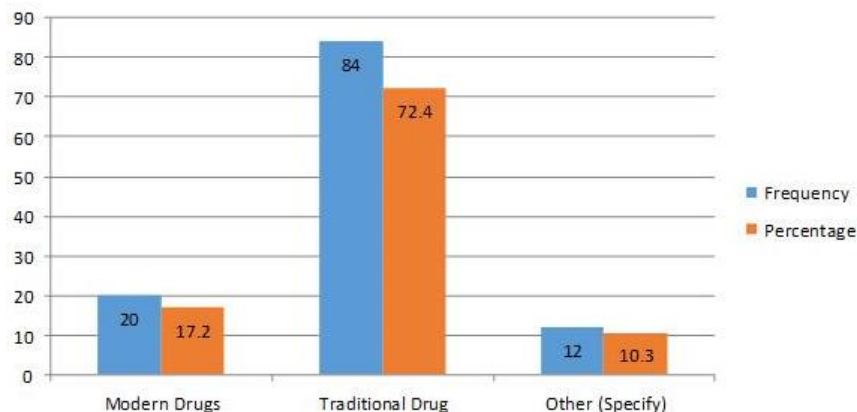
Variables	Frequency	Percentage
Yes	62	51.7%
No	54	45%
Others	4	3.3%
Total	120	100%

Physical manifestation of lymphatic filariasis impaired happiness in marriage. The highest percentage of respondents accepted that lymphatic filariasis impaired happiness greatly making 89 (74.7%) while 27 (22.5%) did not accept the notion.

Research Question 2

What are the preventive and treatment measure of lymphatic filariasis in the study area?

Fig. 1: Showing Belief on mean of cure for lymphatic filariasis



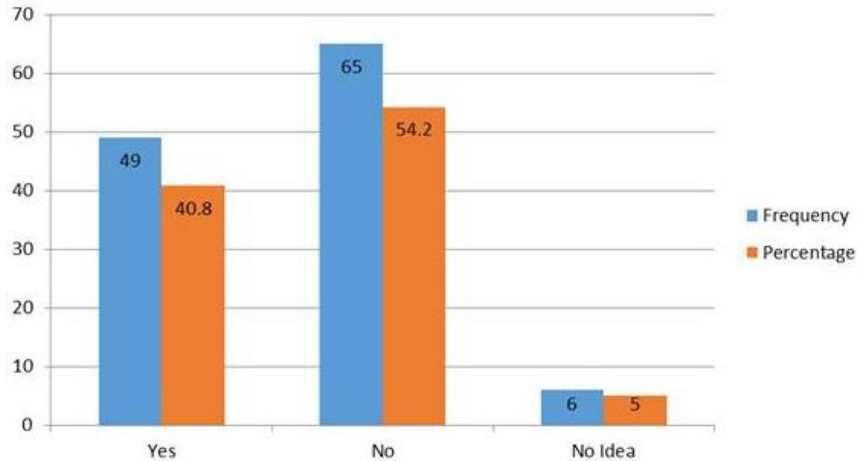
Description:

Respondents were asked about their opinion on what they believe is the means of curing lymphatic filariasis. Out of 116 who answered this question, 84 (72.4%) believed traditional drugs will cure it, 20 (17.2%) believed modern drug will cure it while 12 (10.3%) suggested other means but did not specify.

Efficacy of Albendazole

Respondents were informed of the drug called Albendazole used for control of lymphatic filariasis. Their belief of its efficacy for the control of lymphatic filariasis was further assessed as

followed. Altogether 120 respondents were assessed about their opinion on the effectiveness of albendazole. Out of 120 respondents, only 49 (40.8%) believed that albendazole will be effective in control of lymphatic filariasis, 65 (54.2%) did not believe in control of this disease while 6 (5%) did not state their opinion.



Discussion of the Findings

In research question, most of the respondents were able to identify two means of curing lymphatic filariasis which were modern drug and traditional drug. The traditional drug had the highest frequency 84 (72.4%) due to their in-dept knowledge and cultural belief on disease causation. Modern drugs were only 20 (17.2%) and 12 (10.3%) respectively. Others were not specific in the management of lymphatic filariasis. Furthermore, the efficacy of modern drug called albendazole was further analyzed. 40.8 percent believed that albendazole work effectively in control of lymphatic filariasis while (54.2%) did not believe.

Finally, research question showed that greater percentage of the respondents accepted that lymphatic filariasis had numerous negative effects on their health and wellbeing, which included financial burden to individual, disfigurement of affected limbs, stigmatization, isolation, abandonment by their relatives and divorce among others. 51.7 percent of respondents accepted the notion that marrying an infected person is a taboo while 45% did not accept and 3.3% did not specify their opinion. There was a general consensus among respondents that if someone develop elephantiasis or hydrocele before getting married such a person would find it difficult getting a spouse. This appears worse for females but if disease developed after the person has already gotten married, the couple may try to cope. One of the participants commented that he cannot marry a woman with this type of disease.

Conclusion

This study exhibited that majority of the respondents was unaware about the effect, preventive and treatment measures of lymphatic filariasis. They stated their belief on misconception. The effects of the disease were equally identified by the respondents which include mark, financial burden and loss of productivity. In this study, greater percentage of respondents stated their indigenous belief on use of traditional drug in management of lymphatic filariasis and paid little

or no attention to the modern drug. In conclusion, very few respondents agreed that albendazole were effective in the treatment of lymphatic filariasis while large proportion did not agree.

Recommendations

Based on the findings of this study, the following were recommended:

1. The government should develop a policy for filariasis endemic zone to test every patient who present with malaria bite and symptom for lymphatic filariasis. The testing facilities should also be expanded to include health centres and the dispensary level to reduce cases of delayed diagnosis in the area.
2. Studies should also be carried out if there is some genetic predisposition that makes some individual in the household not susceptible to lymphatic filariasis.

REFERENCES

- Andrade, L. A., Medeiro, Z, & Pires, M. L. (2004). Comparative efficacy of three different diethylcarbamazine regime in Lymphatic Filariasis. *Transformation of Royal and Societal Tropical. Medicine. Hygiene*; 89:319-321
- Becker, M. H. (1974). The health belief model and sick role behaviour. *Health Education Journal*, 2(2): 406-419.
- Burkot, E. (2007). Vector-control synergies between “Roll back to control malaria & lymphatic filariasis. *A journal for vector borne disease*. Stanford University.
- Centre for Disease Control, (2010). *Evaluating mosquitoes for insecticide resistance: web-based instructions*. Atlanta, Georgia, Centers for Disease Control and Prevention, <http://www.cdc.gov/ncidod/wbt/resistance/>, accessed 14 April 2010
- Cumhance, C. E. (2010), *Thesis: community perceptions and practices regarding transmission and management of human porcine cysticercosis in Angonia rural district. Mozambique: Nairobi, University of Nairobi*.
- Dryer, G., Noroes, J., & Fiqueredo-Silva J. (2008), Pathogenesis of Lymphahtic filariasis disease in Bancroftian Filariasis: *A clinical perspective parasitology today*, 16 (185) 544-548.
- Kalage, P. (2009). The important of sick role to patient in recovery of illness. *American Society for Public Health*. Stanford University Press.
- Kirscht, J.P. (1974). The health belief model and illness behavior. *Health Education Monogram*, 2:378-408.
- Morris, J., & Bennett, S. (2012). *Economic cast and benefit of a community based lymphoedema treatment*. A textbook of tropical medicine. (2nd ed.) University of California.
- Njenga, S. M., Mwandawiro, C. S., Wamae, C. N., & Mukoko, D. A. (2011). The strategies for eliminating of lymphatic filariasis in human population. *Journal of Public Health Education*. U.S.A
- Nkrumah, F. K., Dungo, S. K., & Simonsen, P. E., (2006). *Single dose treatment of wuchereria bancrofti infection with ivermectin and albendazole alone or in combination*. Evaluation of the potential for control at 12 months after treatment.
- Norris, L. (2012). The effect of elephantiasis and hydrocele in individual life: *A journal of public health and epidemiology*, 42 (3), 357-354.
- Nutman T. B (2011) Regulation of the immune response in lymphatic filariasis: perspectives on acute and chronic infection with wuchereria bancrofti in South India. *Parasite Immunology* 23: 389–399
- Olsen, E. A. (2007). Strategies and tools for the control/elimination of Lymphatic filariasis. *Bulletin of World Health Organization*, 75 (6), 491-503.

- Palumbo, E. (2008). Filariasis: diagnosis treatment and prevention. *Acta Biomedical* 79: 106-109.
- Rosenstock, I. M. (1974). Historical origins of the Health Belief Model. *Health Education monogram*, 2:328.
- Shenoy, R. K. (2000). Lymphatic filariasis in children. *The Indian journal of lymphology*, 1, 7-13.
- WHO, (2000). Preparing and Implementing a National Plan to Eliminate Lymphatic Filariasis: A Guideline for Programme Managers. A guideline for programme managers. Geneva: World Health Organization (WHO/CDS/CPE/CEE/2000.16).
- WHO, (2002). Global programme to eliminate lymphatic filariasis: Annual report on lymphatic filariasis, Geneva: *WHO mimeographed document* WHO/CDS/CPE /CEE/2002.28.
- WHO, (2012). Marriage, Sex and Hydrocele: *An Ethnographic study on the effect of Filarial Hydrocele on conjugal life and marriage ability*. Orissa, India.
- Wynd, W. D., Durrhein, D. N., Carron, J., & Gua, P. M. (2007). Understanding the community impact of Lymphatic Filariasis a review of the socio culture literature, *Bull World Health Organization*, 88 (6), 493-498.