Sujatha, Vadrevu. and C.R.Nagendra Rao "Environmental Care In The Control Of Filariasis – A Case Study" in Martin J. Bunch, V. Madha Suresh and T. Vasantha Kumaran, eds., *Proceedings of the Third International Conference on Environment and Health, Chennai, India, 15-17 December, 2003*. Chennai: Department of Geography, University of Madras and Faculty of Environmental Studies, York University. Pages 529 – 536.

ENVIRONMENTAL CARE IN THE CONTROL OF FILARIASIS – A CASE STUDY

Vadrevu.Sujatha* and C.R.Nagendra Rao**
Teacher's Technical Training Institute, Taramani, Chennai, India.

Abstract

This paper covers the control of filarial disease in rural and slum areas near Rajahmundry city.

The environment consists of both biotic and abiotic components. The abiotic components are contaminated by rapid growth of population, urbanization and industrialization. The urban and industrial centers discharge huge amounts of waste of varying quality and quantity from different sources into the environment. These wastewaters need to be properly handled before final disposal. Improper management of natural waters and wastewaters of this nature could cause health havoc with the spur of diseases like fileria.

The rapid growth of population leads to the establishment of more industries in urban centers of Rajahmundry to provide employment, and also to meet the basic needs of the people. Major environmental conditions like topography of city, uneven surface of land, poor socio-economic conditions of the communities, illiteracy, wastewater stagnation, no proper drainage system in slum areas, improper drainage and sanitation facilities in rural areas, migration of people from rural to urban areas for education, employment and business, low areas in yards and alleys, heavy rains draining into roadside ditches, potted plants, and poorly drained curbs lead to filariasis in the city of Rajahmundry. The migrant people are unable to pay more rent in urban areas so they build houses at unauthorized areas called slums.

The major environmental conditions in slum areas are that the houses are congested, there is no ventilation, no sanitary facilities, no power and no drinking water facilities. Disposal of huge waste in all medias, common toilets that are not properly maintained, and no roads and streetlights, lead to communicable disease like filaria.

This paper covers the peoples' participation, and activities of certain agencies connected with filaria control.

Introduction

The environment consists of natural and man-made factors. The natural factors are air, water, soil, light, temperature, and ores of minerals, flora, fauna and human beings. The man made factors such as social, culture, economic, and political entities exist in it. The natural components are contaminated by the rapid growth of population, unplanned urbanization and industrialization. The urban and industrial centers discharge huge amount of waste of varying quality and quantity from different sources into the environment. These wastes need to be properly treated before final disposal into the environment. Improper management of natural waters and wastewaters of this nature could cause health concerns with the spur of diseases like filaria.

Filaria does not kill persons but it produces pain and sufferings and makes the individual disabled affecting his free movement. The parasitic nematodes worms of three significant species are Wucherias bancrofit, Brugia malayi, and Brugia timori cause the filarial disease.

In world lymphatic filariasis affects 120 million people in 80 countries throughout the tropics and sub-tropics of Asia, Africa and the Western Pacific islands and parts of Caribbean and South and Central America [1]. More than 40% of all infected people live in India and one-third live in Africa [2]. While two-thirds of the people infected with lymphatic filariasis live in India, China and Indonesia. The World Health Organization (WHO) estimates that 8.2 million people are infected with Wuchereia bancrofit but other estimates are as high as 250 million[3]. Another report of WHO/India has given alarming figures estimate as 374 million living in endemic areas and 45 million infected individuals; in India according 1995 estimates, globally there are nearly 1,100 million people living in areas endemic for lymphatic filariasis and exposed to the risk of infection and there were 120 million cases of filariasis either having patent microfilaria or chronic filarial disease. The following statistics of the disease with reference to India projects the separate nature and infection potential of the disease to further spread if not checked rightly. In India 1953, it was estimated that about 25 million people lived in filarial endemic areas and that it increased to 236 million in 1976, out of which 62 million in urban areas and 174 in rural areas. About 18 million persons have filarial parasite in their blood and 14 million suffer from the disease [4]. In India 289 districts were surveyed for filariasis until 1995 out of which 257 were found to be endemic. In India a total of 553 million people are at risk of infection and there are approximately 21 million people with symptomatic filariasis and 27 million microfilaria carriers. Wucheria bancrofit is the predominant species accounting for about 98% of the national burden, widely distributed in 17 states and 6 Union territories in India. Andhra Pradesh is one of these 17 states[5].

Method

Case Study method; the investigator personally interviewed the agencies to find out the cause of filariasis.

Rajahmundry is a historical city situated on the banks of the river Godavari in East coast districts of Andhra Pradesh. East Godavari is rich in forests, fertile cropland, coconut plantations and is rich in natural resources. The City is situated on 17^0 North latitude and 81^0 East longitudes and the total geographical area is 11.5 square kilometers. The population in 1972 is 1.75 lacks and according to 2001 census the population is 3.83 lacks, nearly 4 lacks after thirty years. Now 2003 reports most of the people have shifted from slum areas to satellite cities for pushkharam arrangements. Pushkaram is religious and social festival, which is celebrated once in twelve years and was held in August 2003. Now the population is less than 4 lakhs. It is a holy place and commercial urban center. Most of the people visit this place for religious rituals and commercial purpose and discharge huge amounts of waste during their activities.

Rapid growth of the population has lead to the establishment of more industries in the urban center of Rajahmundry, to provide employment and also meet the basic needs of the people. Most of the people are migrating from rural areas to urban for education, business and employment. The migrant people were unable to pay more rent, so they built houses at unauthorized areas with limited facilities for sanitation and hence slums have developed.

Environmental Conditions in the City: The city is surrounded by villages and agriculture fields, no infrastructure facilities like sanitation and drainage. The wastewater stagnates in open places in rural areas. The river Godavari is a major source of water. The city and suburb areas are surrounded by agricultural land. The topography of the city is uneven and that adds to the problem of the improper drainage system. Stagnation of waste, and wastewater is very common, due to the non-availability of a proper disposal system, drainage system, and the lack of proper maintenance of roads and solid waste management plans. The major features of slum areas are the houses are congested, there is no ventilation, no sanitary facilities, no power and no drinking water facilities. Also the disposal of huge waste in all medias, common toilets which are not properly maintained, no roads and streetlights and also poor socioeconomic conditions and illiteracy of the communities lead to unhygienic conditions. The physical factors like climate (temperature, humidity, and rainfall) are also important factors in disease transmission.

Climate: Monsoon season in Rajahmundry is July to October. The city gets rains during this season and rainwater stagnates in low lying areas. The stagnated water is a breeding place of mosquitoes.

Social aspects: Most of the people work as daily wage labourers in small-scale industries, shops and restaurants and in self-employment like vegetable, fruits, and flower vendors, cycle-rickshaw pullers etc. They live in rented or owned houses in congested areas and slums and take little care for personal hygiene.

Economic aspects: Most are in the low-income group.

Crops: Rice, maize, sugarcane, coconut, banana and mango are major commercial crops

Education: Most have elementary education or are high school dropouts. Few of them are illiterate.

Industries: The major industries are Andhra Pradesh Paper Mills (APPM), Food processing, ceramic and dyeing industries. They discharge huge amount of waste from the processes. The waste is disposed into River Godavari or on land.

Sanitation: Earlier existing drains are blocked with solid waste and fecal matter. Corporation authorities have now (2003) constructed permanent drains covered with cement slabs. Low lying areas are filled with debris. Dustbins are arranged for disposal of commercial and domestic waste.

Population of mosquitoes: The major species are Culex , Andes, Anopheles, Mansonia, Armyzries. Culex quinquefasciatus is a disease-causing mosquito.

All these above conditions are favourable to breed mosquitoes but these conditions create problems for human beings, causing endemic diseases like filarial and malaria in the city.

Disease Agents: Wucherias bancrofit,and Brugia malayi are major species found in Rajahmundry surroundings., The adult worms live in the human lymphatic system. Man and mosquito are reservoirs for disease agents. Man is the primary (definite) host, Culex mosquito is a secondary (intermediate) host of the disease. Culex mosquito is a carrier of filarial disease from a diseased person to a healthy person.

Several organizations conducted research on the control of filariasis in the world. In India agencies like National Filaria Control Programme (NFCP) and National Institute of Communicable Diseases (NICD) and other voluntary organizations are conducting research and training programmes to control filariasis. Most of the people suffer from Lynph adima (Hands), and legs, lymph engities, limph glands and hydrosil.

Agency I: NFCP was launched in India 1955, based on the pilot scale trials carried out by the Indian Council of Medical Research (ICMR) in Orissa. Currently, The NFCP covers a population of about 40 million (7% of the population at risk), restricted to urban areas only. The current strategy includes selective chemotherapy by detection of parasite carries by night blood surveys and larval control of vector mosquitoes. NFCP is unable to cover risk-taking areas residing in rural populations because it is difficult to detect the parasite in night blood surveys, it is costly, time consuming and poorly accepted by the community.

National Filarial Control Project is a separate department established in 1972 under the control of the State Government to control the filarial disease. The department consists of 32 field workers, six supervisors, two insects collectors, two health inspectors, one lab technician and chowkidar. The department divided the Rajahmundry city into two Zones

Zone I. From By pass road to Alcot Gardens
Zone II Old Town APPM, Municipal colony, 3 roads in Danavaipet. The Zones are again divided into 44 wards. Further 44 wards were divided into 96 blocks, the total drains covered area is 2,36,762 sq.mts for anti larva operation work.

They organize the tests in two methods. 1.Clinical method. 2.Survey method. The tests are conducted at two stages 1.Parasitological test, 2.Entomological test.

According to official reports, they tested 7,976 blood smears in the year 2002. 53 cases out of 7,976 are found to be microfilaria positive cases. These persons have microfilaria in the blood. The persons did not get fever because they were below the 3rd stage microfilaria. They were given 12 days treatment according to their age. The dosage of diethyl carbogygine citrate is given 16 milligrams per body weight. They instructed the patients, to take the medicine as soon as they get fever. Fever is the symptom to identify the disease in the blood. They receive help from students and voluntary organization for the distribution of medicine during the epidemic time.

Clinical Test

In 1972 the rate of microfilaria was 15 %; and disease rate was 2%.
In 2002 the rate of microfilaria was 0.72% and disease rate was 0.78. The microfilaria rate has gradually decreased within the 30 years. Collected blood smears are examined in the laboratory. NFCP organizes clinical test every Friday.

Mosquito Collection

They go to house to house for collection of mo squitoes (near the breeding places). In 2002 they collected 6130 culex mosqyitoes. The female culex mosquitoes are 4571 in 1290 hours. The rest of the mosquitoes are Anaphilous, Aedies, Mansonia, Armyzries. Male culex mosqutoes are not used for testing.

ACCORDING TO STATISTICAL DATA

Parasitological data	1972	1996	1997	1998	1999	2000	2001	2002
Infection rate	12.4%	1.11%	1.51%	1.57%	1.87%	1.94%	1.85%	2.04%
Infective rate	3.5%	0.49%	0.59%	0.80%	0.73%	0.62%	0.6%	0.7%
Mosquitoes infective L1	-	59	62	61	79	78	-	-
Microfilaria stage L2	-						-	-
Microfilaria L3	-	27	23	25	30	25	-	-
Endomacity rate (Infection rate+ Infective rate)	15.9		2.1	1.76	2.29	2.56	2.45	2.82

Table II
Survey Data

Parasitological data	1996	1997	1998	1999	2000	2001	2002
1.Blood Smear Collection	7218	7732	7373	7328	7401	7796	7976
2.Micro Filaria Positive Cases	170	154	99	145	135	83	53
3.Micro Filaria Rate	1.48	2.0%	1.35%	1.97%	1.82%	1.06	0.72
4.Disease Rate	0.20%	0.46%	0.74%	0.64%	0.60%	0.53	0.78
5.Disease Cases	15	34	55	47	45	42	63

Table III
Clinical Data

Parasitological data	1996	1997	1998	1999	2000
1.Blood Smear Collection (test dose)	1862	1674	1035	1039	891
2.Disease cases	1755	1514	992	964	794
3.Positive cases for M.F.	11	6	2	-	19
4.M.F.RATE	0.59%	0.35%	0.19%	-	2.13%
5.Disease rate	94.25%	90.44%	95.44%	92.78%	89.11%

M.F.Micro Filaria Rate

Table IV

Collection of mosquitoes	2000	2001	2002
Total mosquito	5,653	5115	6.130
Female culex moquitoes	4007	3623	4571
Percentage	29	29	25

Disease control measures:

Chemical, Biological and Environmental methods are applied for larva control. Conducting anti larval operations is a continuous process using Baytex and Abate.

Chemical Method:

1.Batex is used in drains, contaminated water sources, ditches
2.Abate used in fresh water storage tanks. Abate 2.5 ml/ 10 lts 500 liner meter drains. . Baytex 5ml/10lts used for 500 liner meters
3.Vector Control
4.Spraying Pyrethram, Malathine.
5.Oil balls are thrown into stagnate water, tanks, & ditches. The oil spreads into ditches to control the development of larva.

Biological Method:

Gambusia affinis fish is the biological agent to control larvas.

Environmental method:

They inspect the septic tanks of residential area and cover septic tanks with nets.

They spray chemicals in open areas of the residence

The municipal drains are freed of silt and vegetation to facilitate the free flow of water.

Elimination of water logged areas, the filling of small holes, abandoned ditches, and burrow pits and ponds, cess pools, unused tanks.

Minor engineering methods like filling up unused wells and removal of aquatic plants (Pistia, salvania),

Polystyrene balls may be used in pits and latrines; unused wells to prevent access of culex mosquitoes.

AgencyII: National Institute of Communicable Diseases regional office is established in Rajahmundry to control endemic diseases like filariasis, malaria and other diseases. They conduct survey camps and collect blood smears from patients of rural and tribal areas and examine these in the laboratory. Disease cases are referred to the NFCP for further treatment. They collect blood smears from patients and examine them in the clinic after 8 p.m every Wednesday. Based on the results medicines are prescribed for positive cases. They organize training programmes to Health inspectors, field workers, ANMs, Health visitors etc.

Ex. NICD, Rajahmundry branch conducted a filariasis survey in Eluru, West Godavari district, of A.P. 3,396 blood smears were collected and examined out of which 150 were found to be microfilaria positive (MF rate 4.4%). Disease rate was found to be 1.6%. Ten men hour density of culex quinquefasciatus was 140 and infection rate was 6.4%.[6]

Results

According to parasitological data (table1) the infective rate has gradually decreased from 1972 to 1996 due to precautionary measures taken by the NFCP. From 1996 to 2002 the infective rate and endomycity rate are fluctuating due to the migration of people from rural areas to the city for education and employment. Most of the people are coming from other parts of the State for treatment. There is no separate register for local and outside patients.

More slums have developed due to the migration of people. The city outskirts have also extended. NFCP is unable to cover extended areas due to inadequate staff numbers; most of them are retired and there is no new recruitment. Extended areas of the city are risk-taking places. They are unable to manage larva control measures. NFCP strengthened its survey camps and collected more blood smears for clinical studies. Microfilaria positive cases have decreased from 1996 to 2002, the results are shown. (table II). We were unable to get data for table III during the years 2001to 2002. The percentage of density of culex mosquitoes has decreased from 2000 to 2002 (tableIV).

The municipal authority has taken steps to improve the following environmental conditions in the city (The following environmental conditions have improved from one year onwards)**:**

1.Families from slum areas have shifted to satellite cities.
2.Permanent cement roads and drains are constructed. The roads are widened
3.Municipal drains are covered with cement slabs.
4.Residential people should not throw waste on open areas. They should dispose of this in a street dustbin.
5.Municipal scavengers clean roads and drains daily.
6.The municipal drains are allowed free flow.
7.Daily municipal trucks clear and transport waste from dustbins.
8.The sewage water from minor drains goes through the main drain Nalla channel to the river.

Conclusions

Government and voluntary organizations should focus their attention on improving infrastructure facilities in rural and slum areas. Still most of the people in the slum and rural areas are illiterate and of low socioeconomic status. They require minimum needs, income, sanitation, ventilated housing, drinking water, and education to improve their condition. It takes time to improve their condition. Strengthening of NFCP survey camps and primary health centers help to control filariasis at rural areas. Panchayat Raj authorities at rural areas and corporation authorities in the city are necessary to supervise the functioning of the system. Participation of the public in the clean and green campaign is the only way to improve environmental conditions of this historic city.

Recommendations

1.Protection of the environment is part of our life.
2.People participation is important to maintain healthy and hygienic conditions.
3.We should obey our rules, laws and regulations.
4.Bed net should use while sleeping
5.Rural areas should also be covered by anti-larval operations.
6. The concerned authorities should appoint the required staff for operating work.
7.We should educate people through non-formal education.
8.Should construct drains at villages and slum areas

References:

1.http://www.cdc.gov/ncidod/dpd/parasites/lymphaticfilariasis/factsht_lymphatic_filar.htm.
2.http://www.who.int/tdr/diseases/lymphfil/diseaseinfo.htm
3.http://www.mscionline.com/Tropical%20%Disease%20Fact%20sheets/lymphatic_filariasis
4.Handouts given by National Institute of Communicable Diseases (Regional Filaria Training and Research Centre), Rajahmundry.
5.Ibid

6.http;//mohfw.nic.in/kk/95ibok01.htm.