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Assessment of microfilaria prevalence in Karimnagar and Chittoor Districts of Andhra Pradesh, India

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ABSTRACT

Objective: To assess the prevalence of disease and microfilaraemia in villages of Karimnagar and Chittoor districts. **Methods:** Data on age and sex of all the respondents were collected and compared with the microfilaria rate (mf) and density (20 μ L of peripheral blood by using finger prick method) to examine the relationship between the dynamics of *Wuchereria bancrofti* among the population. **Results:** Microfilaraemia prevalence was found among all the age groups and its occurrence was more prevalent especially above 30 years age groups. Similarly, the microfilaraemia and disease rates were found significantly higher in males compared to females. **Conclusions:** Using these baseline data would be useful in planning for the elimination of lymphatic filariasis in Andhra Pradesh as per the WHO goal to eliminate lymphatic filariasis by 2020.

1. Introduction

The transmission of lymphatic filariasis (LF) parasites were reported by various mosquito species (*Aedes*, *Anopheles*, *Culex* and *Mansonia*) world wide[1] and World Health Organization (WHO) estimated the burden of disease was 4918000 disability-adjusted life years (DALYs), the highest of all tropical diseases[2]. The filariasis cases have been reported mainly in Asia, Africa, Western Pacific and some parts of America[3]. In Asia, the Indian sub-continent, over one third of the population is at risk of this infection (most often with microfilaria in their blood)[4]. LF is recognized as a non fatal disease but due to its infection, severe morbidity and disability is generally observed[5–7]. In India, filariasis is mostly by nematode parasites *Wuchereria bancrofti* transmitted by either *Culex quinquefasciatus*[8] or *Brugia malayi* by *Mansonia* mosquito species[9]. Till now there are 22 States are reported for filariasis incidences out of which

the state Andhra Pradesh (AP) is one of the severely affected state in which 16 districts have been reported for endemic zones for filariasis[10]. Accordingly to health official data, all the villages were under Mass Drug Administration (MDA) program (a program to eliminate lymphatic filariasis by the year 2015). Government of India has initiated this program during 2004, with annual single dose of diethyl carbamazine citrate (DEC) tablets to all the population living at the risk zones of filariasis) but unlikely a high number of cases have been reported in Karimnagar and Chittoor districts of AP[11,12]. There is no report available on the quantification of disease load in these two districts. Hence, a pilot scale study has been carried to understand the transmission and dynamics of filariasis between genders and different age groups in these two districts, which can provide valuable information for the health official to suppress the disease load in future control programs.

2. Materials and methods

2.1. Study area

The Karimnagar district lies on the Northern part of Andhra Pradesh approximately between the 18°25' 48" N,

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79° 9' 0" E and Chittoor district lies on the extreme south of the state approximately between 12°37' – 14°8' N and 78°3' – 79°55' E. The climate is classified as summer temperature ranges from 20 °C–46 °C between winter and monsoon (June–December) periods.

2.2. Study design

Before investigations, the local authorities and the residents of the selected villages were informed about the proposed study. Before collecting blood samples all respondents were interviewed separately using a structured questionnaire (on their knowledge, attitude and behavior in relation to filariasis). A record of age, sex, occupation, educational status, socioeconomic status details and mosquito avoidance were also collected from each respondent.

2.3. Blood sample collection

A total of 11 624 blood smears were collected from Karimnagar (5794 respondents from 30 villages) and Chittoor district (5 830 respondents from 30 villages) among the different age groups during 2004 to 2007. Peripheral blood (20 μ L) was collected from each respondent, randomly selected household (regardless age and gender) by using finger prick method and prepared smear on clean glass slides between 20:00 and 23:00 hours^[1] and coded. These smear slides were then fixed with methanol, stained in JSB II solution, dried and examined using compound light microscope. Data was collected on the number of microfilaria (MF) from each positive slide screened. The results are expressed in percentage of individuals infected with microfilaraemia (MF rate) and microfilaria density per 20 μ L of blood (MF density). The study received ethical clearance from the Ethical Committee constituted by the institute.

3. Results

The MF rates ranged from 0.0% to 10.5% in Karimnagar district, and 0.0–7.0% in Chittoor district. There was large variation on the intensity of MF rates among the respondents from all the 60 villages of Karimnagar and Chittoor districts. Out of 11 624 samples collected, 5 835 respondents were male(50.2%) and 5 789 respondents were female (49.8%). In our study it is noticed that, higher percentage of MF positive cases was found among males compared to females. In Karimnagar district, out of 5 794 blood smears 124 (71 males and 53 females) were found to be positive for microfilaria. Similarly, in Chittoor out of 5 830 respondents 52 (28 males and 24 females) were positive for microfilaria.

3.1. Microfilaria density among male and female groups

The sex wise distribution of MF density from Karimnagar and Chittoor districts is shown in the Table 1. The microfilarial density among respondents/individuals were classified in four levels like 1–10, 11–20, 21–30 and >30 microfilaria per 20 μ L of blood. Out of 176 positives cases observed majority of infected individuals were with 1– 10 and 11–20 MF/20 μ L of blood. Whereas, 21–30 MF/20 μ L density was recorded from 13 samples (7 males & 6 female) and >30 MF density was recoded from 11 samples (6 males & 5 females) from both the districts (Table 1). The highest microfilaria count from male populace was 106/20 μ L of blood observed in 16 year old from Thumendula Palem of Chittoor district and 58/20 μ L was found in a 36 year old from Ramavaram village of Karimnagar district. Among females, the highest microfilarial count of 35/20 μ L was observed in a 40 year old woman of Thumendula Palem village from Chittoor district and 44/20 μ L of blood was recorded from a 43 year old woman from Nagireddyapur village of Karimnagar district.

Table 1

Density of microfilariae (MF/20 μ L blood) by gender and district wise.

Microfilaria density (mf/mL)	Total samples	Karimnagar		Chittoor	
		Male	Female	Male	Female
1–10	120	49	35	20	16
11–20	32	12	11	5	4
21–30	13	5	3	2	3
>30	11	5	4	1	1
Total	176	71	53	28	24

3.2. Microfilaria density by age group

The comparative age prevalence of total microfilaraemia in Karimnagar and Chittoor district females and males is shown in Figure 1 and 2. In Karimnagar district the prevalence of microfilaraemia in males showed a monotonic rise to an asymptote in adults (26–30, 36–40 and 46–50 years), following which it was relatively stable in older age groups ($P=0.670$). The microfilaraemia prevalence in females was

high in 11–15 years age, after that it was seen to be stabilized at 21–50 years age, later it was found to decrease in older age groups. In Karimnagar district, there was a significant difference in microfilaraemia prevalence between the sexes and age classes ($P=0.002$). Likewise in Chittoor district, the prevalence of microfilaraemia in males increased from the 21–30 years age class and afterwards it gradually decreased ($P=0.530$). In the age groups of 41–50 years and above the MF prevalence was observed to be moderate. The microfilaraemia prevalence in females was high in 16–

20 and 36–40 years age groups and in other age groups it was constant and later it decreased in older age groups ($P=0.013$).

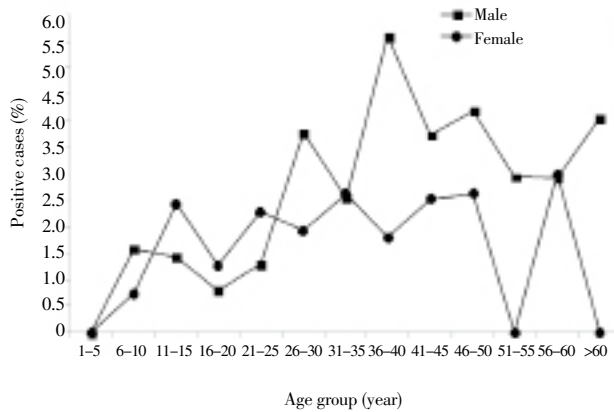


Figure 1. Age group, sex and total positive cases (%) distribution of survey participants in Karimnagar District of Andhra Pradesh.

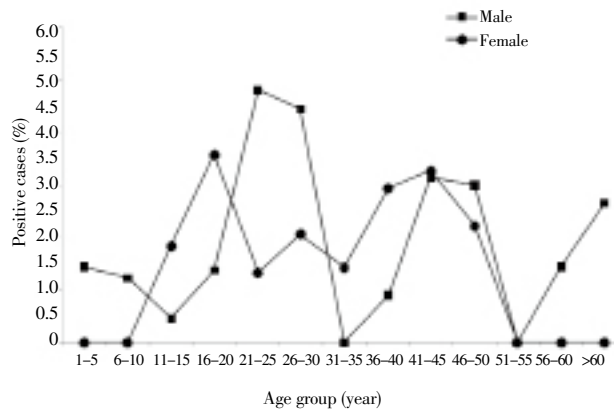


Figure 2. Age group, sex and total positive cases (%) distribution of survey participants in Chittoor District of Andhra Pradesh.

3.3. Chronic clinical filariasis

The chronic condition of lymphatic filariasis, namely elephantiasis (lymphoedema), was prevalent in the study population. The risk factors of infection and disease due to *Wuchereria bancrofti* (*W. bancrofti*) was difficult to characterize because of the complex life cycle of this mosquito borne helminth and because of the broad range of clinical signs and symptoms which are characteristics of this nematode. Chronic conditions of elephantiasis alone were recorded in 89 people (37 males and 52 females) from Karimnagar and 27 (13 male and 14 female) from Chittoor districts. Most of the males and females had swelling in right or left (or both) in upper and lower limbs affected by lymphatic filariasis. While these figures are an indication of a substantial disease burden in the communities examined but they do not accurately reflect the level of burden in the study areas on a random survey basis.

4. Discussion

The result of this study reveals that lymphatic filariasis is prevalent in the Karimnagar and Chittoor districts of Andhra Pradesh, India. From both the districts, it is noticed that moderate to low MF rate were observed which may be due to the impact of MDA program since 2004^[13]. Whereas, villages of Karimnagar district (Mannempalli, Basavapuram, Ramavaram and Parlapalli) and Chittoor district (Thumendula Palem and Kanipaka Patnam) showed higher microfilaria rate (>5/200 blood samples) which clearly indicates that the availability of microfilaria is still more prevalent in these village. To understand the nature of distribution of microfilaria among the infected population various studies were undertaken. From our study it is noticed that, the prevalence of lymphatic filariasis was age and gender dependent. This study is also in agreement with earlier reports on the presence of microfilaria rates found more in males compared to females^[14]. Higher intensity of MF found among male respondents, may be due to the nature of their habit and habitat of the study areas. From the questioner it is also noticed that, majority of male respondents generally work in the agricultural fields that are in close proximity to the breeding sites of mosquitoes. Interestingly in the study areas, most of the chronic cases/lymphoedema was found among female respondents. Similar type of observations was also reported by various researchers^[14]. However, high prevalence of chronic clinical manifestations of filariasis were observed more in the older age group of both the sexes (>40 age group).

While comparing the microfilaria rates among the different age groups, it is observed that higher MF was noticed among adults/older persons than the young children. The prevalence of microfilaraemia usually increases with age ^[15]. It was very low in children aged between 5–10 years old, but increased significantly up to the ages of 46–50 years and then decreased in 51–55 age group and found to be slightly higher in people aged 60 and above. This pattern seems to be a general rule as mentioned by various workers ^[15]. In general, adults are more likely to be exposed to mosquitoes than children^[16] and are tend to attract more mosquitoes, because of their greater relative heat or carbon-dioxide output and greater surface area^[17].

From this study it is concluded that, both Karimnagar and Chittoor district of AP are becoming endemic for filariasis. The prevalence of microfilaria primarily or directly related to availability of breeding sites for the mosquito species and the vectorial capacity of the vector *Culex quinquefasciatus*. There is an interesting dynamics of the pathogen among the various age groups of the respondents where in the age group 1 to 5 years there is no or less infection observed that reflects, the people of these localities are very much concerned about the disease and its severity especially among the children. On contrary, in the young age groups (11 to 25 years) there is a significant increase in the MF

among the respondents. Most of the results of our study are in agreement with the earlier reports on the dynamics of microfilaria in the endemic regions. Since this study has confirmed more prevalence of lymphatic filariasis in these two districts hence, possibility of integrating elimination of this disease through effective mass drug administration (MDA) and vector control approaches should be explored immediately.

Conflict of interest statement

We declare that we have no conflict of interest.

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