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Need of Vaccination against Lymphatic Filariasis to Prevent Its Recurrence

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ABSTRACT

The elephantiasis is a vector-borne disease wherein the adult filarial nematode worm blocks the lymph vessels and causes lymphatic filariasis. Even though elephantiasis is not fatal, but it incapacitates and indisposes the sufferers to perform his/her routine activities. Consequently, the livelihood and sustenance of the family is at stake. Therefore, elephantiasis poses public health issue. The diseased subject also constitutes the carrier of microfilariae. The mosquitoes belonging to the genera Aedes, Culex and Mansonia transmit the microfilariae from the diseased individual to the healthy individual. As a result, the spread of this debilitating disease in the community is primarily due to the presence of potential carriers of microfilariae and also due to the seasonal emergence of the vector mosquitoes.

The elephantiasis disease data reported in the present article is obtained from indiastat.com. The recorded data from the years 1995 to 2018 looks to be sporadic. Among the four South Indian states, the number of cases of lymphatic filariasis is significantly more in the state of Andhra Pradesh. However, the downward trend of the reported filariasis disease is noticed in all the four South Indian States by the year 2021. The decreased trend of lymphatic filariasis in south Indian states, as observed in online indiastat.com over the past 25 years starting from the year 1995 possibly is due to the regular surveillance by the health workers and implementation of MDA (mass drug administration) with diethylcarbamazine along with albendazole and ivermectin. Further, the health awareness provided through media and health volunteers must have been contributed to improve the socioeconomic and sanitation conditions in the vicinity of community dwellings that must have yielded the trend to improve community health with a regression model equation Y=161.6 - 0.07973X. Hence, there is an enormous scope to develop multivalent vaccine to arrest filariasis in the community.

Keywords: Lymphatic filariasis, MDA, Andhra Pradesh, Need of vaccination

INTRODUCTION

Elephantiasis is a chronic debilitating disease prevailing preferably in the tropical areas of the world. These patients suffer from the lymphedema and hence they are physically disabled. They also suffer due to socio-psychological events namely mental, personal, poverty and financial aspects. The global baseline estimate of people suffering due to lymphatic filariasis was reported to be 25 million men with hydrocoele and around 15 million people with lymphedema [1,2] and these patients are now being accompanied with the issues such as solitude, illness and poverty causing severe public health issues.

This disfiguring disease is due to the bite of blood-sucking mosquitoes (Aedes aegypti, Culex quinquifasciatus and Mansonia africana) in the tropical region of the world. There are three nematode worms belonging to the family Filariodidea. They are Wuchereria bancrofti, Brugia malayi and Brugia timori [3,4]. These nematode parasites once mature reside in the lymph vessels and block lymph flow rendering a situation called lymphedema. World Health Organization through a resolution (WHA50.29) advocated to the Member States to eliminate lymphatic filariasis as a public health issue and consequently launched a Global Programme to Eliminate Lymphatic Filariasis (GOELF) in the year 2000 which set the NTD (Neglected Tropical Diseases) roadmap extended up to the year 2030 [5]. MDA (albendazole (400 mg), ivermectin (200 mcg/kg) and

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diethylcarbamazine (400 mg) is implemented in all endemic countries among both the risk individuals and also lymphedema patients living in the endemic zone with the help of health workers annually [6,7]. The progress of NTD roadmap as observed from South India and particularly in the state of Andhra Pradesh (India) is evaluated in the present article through the regression analysis so as to forecast the better living.

METHODS

The data on the prevalence of lymphatic filariasis in patients from four states of South India were retrieved from indiastat.com and National Health Mission (India) [8]. The obtained data is shown in **Table 1**. The regression analysis was performed using online tool viz., https://www.mathportal.org/calculators/statistics-calculator/correlation-and-regression-calculator.php [9]. The resulted regression line and equation are shown in the **Figure 1**.

Table 1. The lymphatic filariasis disease data from the four states of South India collected from indiastat.com and National Health Mission.

Year	State	No. of cases of Lymphatic filariasis	State	No. of cases of Lymphatic filariasis	State	No. of cases of Lymphatic filariasis	State	No. of cases of Lymphatic filariasis
1995	TN	13,00,000		NA		NA		NA
1996	TN	13,30,000		NA		NA		NA
1997	TN	13,50,000	AP	15,40,000	Kerala	2,50,50,000	KA	
2014	TN	59,523	AP	1,04,771	Kerala	18,917	KA	20110
2018	TN	59325	AP	90,423	Kerala	18462	KA	19674
2021 [8]	TN	24204	AP	42,343	Kerala	18093	KA	15,638

TN: Tamil Nadu; AP: Andhra Pradesh; KA: Karnataka; NA: Data Not Available

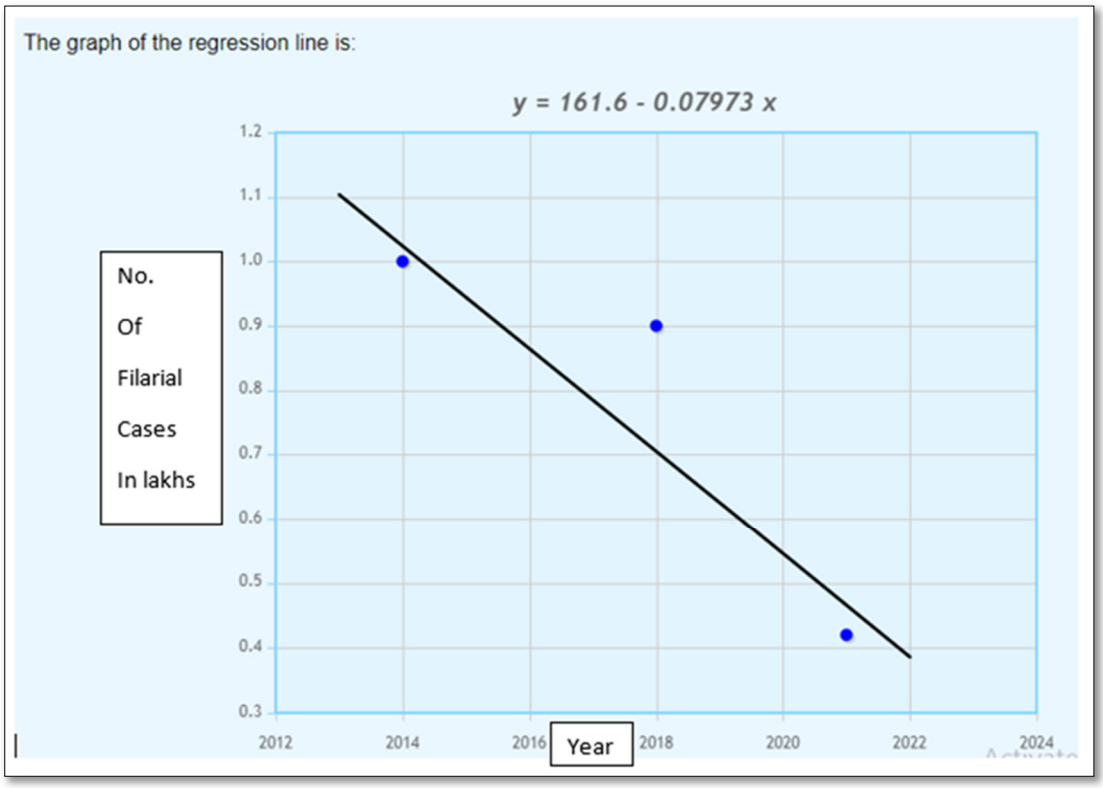

Figure 1. The regression line showing the negative correlation with a regression equation Y = 161.6 - 0.07973 and r = -0.9031 indicating the declining trend of lymphatic filariasis due to MDA promoted by WHO.

RESULTS AND DISCUSSION

The tropical region of the world, particularly the southern hemisphere, is rich in flora and fauna due to its climatic conditions. Further, the insect-vectors are flourishing well in this well-populated zone of plants and animals. Hence, there is an enormous scope for zoonotic infections to transmit and spread across the mammalian species and humans. One such is the elephantiasis, a serious disfiguring disease due to the defined mosquitoes indicated in the introduction section. The mosquitoes are the intermediate host for filarial worms. While sucking the blood from the infected subjects, the microfilaria goes into the gut of the insect and settles in the salivary glands up to L3 stage (third instar). This stage of microfilariae is the infective stage which is carried to the naïve uninfected man once bitten by the microfilariae carrying mosquito. These transmitted microfilariae are of the size of RBC and keeps staying in the blood stream for a long period (yet to be defined in the literature) till they become adults, then they move to the lymphatic circulation where they reside and produce numerous eggs to continue its life-cycle. During this time the infected individuals face illness due to lymphedema. The MDA (drugs shown in the introduction section) recommended by WHO is being given in all the filarial endemic zones since the year 2000.

The resultant impact of MDA in all the four states of South India is shown in **Table 1**. Most importantly, as per the guidelines of WHO [1,6,9], the contribution of health workers in the dramatic reduction in the number of lymphatic filariasis patients is noteworthy. Among the four states reported, Andhra Pradesh is showing more number of affected cases. By 2021, as per the data from National Health Mission (NVBDCP) [8], the number of reported affected cases is found high in the state of Andhra Pradesh compared to the rest. The regression analysis of the data reveal that there is a linear decrease trend with a significant negative correlation value (r) = - 0.9031 with a regression equation Y=161.6 - 0.07973X, the regression model of which predicts 23,000 filarial cases in the state of Andhra Pradesh by the year 2024 which is a phenomenal decline of filarial cases from the year 1997 **(Table 1)** and thus paving the path to improve the public health of the community which would be further accentuated through prophylactic measures such as vaccination.

CONCLUSION

The number of recorded cases of lymphatic filariasis in the year 1997 in the state of Andhra Pradesh (India) is 15,40,000. Whereas by the year 2021 this number reduced to 42,343 as per the report from NVBDCP. This phenomenal decline in the filariasis cases must have been primarily due to the WHO guidelines & directions; and implementation programs by the health workers. In the present study, the regression model predicted 23,000 filarial cases by the year 2024 in the state of Andhra Pradesh. The risk of transmission of microfilariae due to the potential carriers (infected subjects) and insect vectors may further augment the situation, the same would be abated by implementing and planning the prophylactic vaccines **(Table 1)**.

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