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Filariasis a Curse or Careless Attitude of the People?

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Abstract-'Health is wealth' is a global mantra. Global community is chanting this mantra in its day to day life. But due to circumstances the helpless man is swindled by pathogens which target him as an easy victim by their swift way of actions. Human lymphatic filariasis is an age – old disfiguring disease and thought to be a curse by illiterate rural masses due to their ignorance. Infection with Wuchereria bancrofti, Brugia malayi and Brugia timori infects more than 120 million people in almost all parts of the world and the clinical outcomes of filariasis lead to elephantiasis of the extremities, lymphatic inflammation and tropical pulmonary eosinophilia. The present study reveals female sex specific prevalence of filariasis / elephantiasis, and age related chronic manifestations with noticeable level of changes in immune substances in both sexes.

Keywords- *Brugia malayi, lymphedema, Wuchereria bancrofti.*

I. INTRODUCTION

Human lymphatic filariasis or elephantiasis is a mosquito – borne disease caused by parasitic worms Wuchereria bancrofti, Brugia malayi and Brugia timori. Filariasis is endemic in more than 80 countries, it victimized around 140 million people, out of which 44 million are having elephantiasis, lymphedema and genital pathologies [1, 2]. Parasite, immune response and the opportunistic infection are thought to be some of the critical factors for the inflammatory pathogenesis of filariasis [1, 3, 4].

Elephantiasis is not fatal, but chronic and acute manifestations handicap the individual causing tremendous economic loss which have great psychosocial implications and can inflict grave social wounds [5].

In India, both urban and rural filariasis are major health problems to the people [6], where the bancroftian filariasis vector Culex quinquefasciatus thrives in most urban and rural areas and breeds in stagnant water pools and drains [7]. Likely the brugian filariasis vector Mansonoide mosquitoes breed in aquatic plants in water- logged canals in places like Kerala primarily in the rural India [8]. Earlier studies revealed the male sex specific [9 – 11], age related [12, 13], no link to ABO blood group [14, 15], elevated eosinophilia [16], elevated ESR [8] and polyclonal humoral response with the production of IgG, IgM and IgE antibodies [1,17,18] in human lymphatic filariasis.

The present study is carried out to find out the age, sex, and blood group specific incidence of filariasis /elephantiasis and the clinical conditions and immunological expressions of the disease in the selected rural population. Statistical analysis will be made to find out the validity of the data.

II. MATERIALS AND METHODS

The present study shows the evaluation of the incidence of filariasis and the existence of clinical and immunological conditions associated with filariasis as well as its chronic state (i.e.) elephantiasis in some of the selected rural population of Kanyakumari District, the Southern land mark of the Indian sub – continent [19].

A. Study area and subjects

In selecting the area of study for filariasis and elephantiasis survey 14 villages (viz) Kaliakkavilai, Padanthalumoodu, Puthukadai, Nattalam, Palliyadi, Karungal, Thiruvithamcode, Eraniel, Thalakulam, Thinkalnagar, Mondaicaud, Koottumangalam, Manavalakurichi, and Udayamarthandam have been chosen. The study areas are located very close to the west coast of Kanyakumari district with a spread of more than 30km distance on road.

The filarial survey covered a sizable number of subjects, which includes 350 males and 350 females of age between 11 – 50 yrs. Similarly the elephantoid cases comprise 180 males and 320 females of age between 25 – 89 yrs. The study covers a heterogeneous population of different socio – economic, cultural, religious and linguistic backgrounds. The control (endemic normal), filarial and elephantoid cases are sex, age and area matched. A door to door survey has been conducted to find out the filarial / elephantoid cases [20].

Screening of filarial patients are followed by the method described [21]. Standard methods are used for grading of elephantoid cases lymphedema [22], analysis of blood group [23], total blood cells count [24], WBC count [24], DC [24], measurement of erythrocyte sedimentation rate (ESR) [25], estimations of Hb [26], IgG [27] and IgE [28]. Statistical analyses are made with SPSS statistical package (version 11) [29]. Priority has been given to human values during blood

collection and'Ethics Comittees' guidelines have been strictly followed.

III. RESULTS

To find out the possible association between the blood groups and the prevalence of filariasis, 700 subjects including 350 males and 350 females in 14 villages were screened for microfilariae (mf) by night blood smear technique. Results reveal that 'O' blood group subjects are highly susceptible to filarial infection followed by 'B', 'AB' and 'A' group individuals. The percentage prevalence of infection in 'O', 'B', 'AB', and 'A'blood group are 2.37, 1.89, 1.44 and 1.22 respectively. It is further evident from the study that positive blood group individuals are highly prone to filarial infection (percentage incidence is 1.83) than the negative blood group persons (percentage incidence is 1.01)

TABLE I. REVEALS THE FILARIAL INFECTION IN DIFFERENT BLOOD GROUP SUBJECTS.(N = 700 CASES; 350 MALES + 350 FEMALES).

Blood group(s)	Sex				Total
	Male		*Female*		
	mf + ve	*mf - ve*	*mf + ve*	*mf - ve*	
A : + ve	-	21	1(2.78)	35(97.22)	57
-ve	-	13	-	12	25
B : + ve	2(1.34)	147(98.66)	3(2.19)	134(97.81)	286
- ve	-	25	1(12.5)	7(87.5)	33
AB:+ ve	-	44	1(3.03)	32(96.97)	77
-ve	-	4	-	7	11
O : + ve	2(2.7)	72(97.3)	2(1.87)	105(98.13)	181
- ve	-	20	1(10)	(90)	30

(figures in parentheses are percentage values)
Correlation, r : male vs female (for +ve blood groups) = 0.856
r : male vs female (for –ve blood groups) = 0.937

Table.2. denotes the prevalence of elephantiasis among ABO blood group subjects. The study comprises 320 female (64%) and 180 male (36%) elephantoid cases. A majority of the elephantoid subjects (i.e.) 49.8% are having 'B' blood group, followed by 'O' group (25.8%), 'A' group (14%) and 'AB' group (10.4%) individuals. The study further shows that a vast majority (i.e.) 94% elephantoid subjects are having Rh+ve blood groups and a least number of elephantoids (i.e.) 6% are with Rh –ve blood groups.

TABLE II. DENOTES THE PREVALENCE OF ELEPHANTIASIS AMONG ABO BLOOD GROUP SUBJECTS. (N = 500 CASES; 180 MALES + 320 FEMALES).

Blood group(s)	Sex		Total
	Male	*Female*	
A : + ve	26(40.63)	38(59.37)	64(12.80)
-ve	03(50)	03(50)	06(1.20)
B : + ve	96(39.83)	145(60.17)	241(48.20)
- ve	03(37.50)	05(62.50)	08(1.60)
AB: + ve	15(33.33)	30(66.67)	45(9.00)
-ve	04(57.14)	03(42.86)	07(1.40)
O : + ve	29(24.16)	91(75.83)	120(24)
- ve	4(44.44)	5(55.55)	9(1.8)
Total	180(36)	320(64)	500(100)

(figures in parentheses are percentage values)
CORRELATION, R : MALE VS FEMALE = 0.946

Based on the degree of lymphedema in the patients they are grouped as grade I, II, III and IV (Table.3.). The study includes 13.6% (68 cases, 16 males + 52 females) I^{st} grade lymphedema cases, 33.8% (169 cases, 47 males + 122 females) II^{nd} grade, 23.6% (118 subjects, 44 males + 74 females) III^{rd} grade and 29% (145 cases, 73 males + 72 females) are with IV^{th} grade patients. It is also found that 9.8% (i.e.) 49 cases including 30 (61.22%) men and 19 women (39.78%) are having secondary infections.

Filarial infection has only a minor impact on total blood cells count. In both male and female filarial and elephantoid cases there is no marked level of increase of this cells when compared to their respective controls. There is only a marginal variation in total leucocytes count in filarial and lymphedema cases. The mean leucocyte count in male filarial patients is 6068.5 ± 40.5 whereas in females it is 6110.5 ± 45.6. Likely it is 5025 ± 21.5 in lymphedema males and 5093 ± 20.5 in females.

TABLE I. DENOTES THE PREVALENCE OF ELEPHANTIASIS AMONG ABO BLOOD GROUP SUBJECTS. (N = 500 CASES; 180 MALES + 320 FEMALES).

Disease grade (s)	Sex		Total
	Male	*Female*	
I	16(23.53)	52(76.47)	8(13.6)
II	47(27.81)	122(72.19)	169 (33.8)
III	44(37.29)	74(62.71)	118 (23.6)
IV	73(50.34)	72(49.66)	145 (29)
Secondary infection	30(61.22)	19(39.78)	49(9.8)

(figures in parentheses are percentage values)
CORRELATION, R : MALE VS FEMALE = 0.326

There is a decrease of neutrophils both in the male (7.2%) and female (10.4%) filarial patients and in the lymphedema males 6% decrease and in females it is 8% when compared to their respective controls. But an appreciable level of increase of lymphocytes is noticed in male (28.1%) and female (37.7%) filarial patients and 34.2% in male and 36.8% in female elephantoid cases. An abrupt level of increase of eosinophils is seen in male (359.5%) and female (282.5%) filarial and 313.5% in male and 282.5% in female lymphedema patients when compared to their respective controls. Similarly a tremendous level of increase of ESR is noticed in male (269.1%) female (158.4%) filarial and male (345.7%) and female (224%) elephantoid patients.

A marginal level of decrease of Hb content in filarial male patients (25.2%), female patients (10.9%), and elephantoid males (25.2%) and females (10.1%) have been observed than their respective control groups. Both filarial and elephantoid cases have been shown an elevated level of polyclonal immunoglobulin antibodies including IgG and IgE. There is a noticeable level of increase of IgG in filarial male patients (44.1%) and female patients (47%) whereas it is 52% in elephantoid males and 49.5% in females. A tremendous level of increase of IgE in filarial males (976.7%), females (1036.1%) and elephantoid males (1161.7%) and females (1070.7%) is noticed.

The study also points out that there is no age specific, but female sex specific infection of filariasis. The minimum and the maximum age of the infected cases were 11 and 47 yrs. respectively. The male, female infection ratio was roughly 1:2.

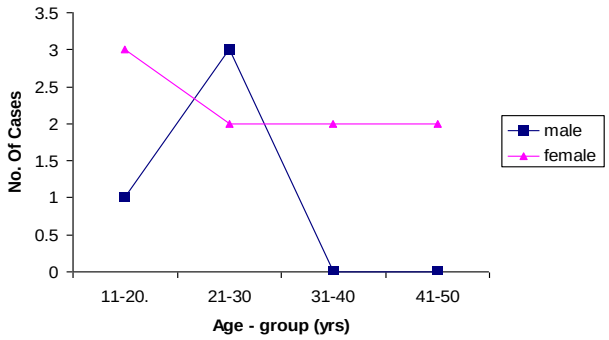

Fig.1. reveals the age - groupwise distribution of filariasis cases.

Fig.2. illustrates the age – groupwise distribution of the elephantoid subjects. Lymphedema has been noticed at the age of 25yrs, it peaks around 40 – 49 yrs and the highest prevalence was seen among the age – groups 50 – 59 and 60 – 69 yrs. It is also quite obvithat 64% lymphedema cases are females and the rest 36% are males.

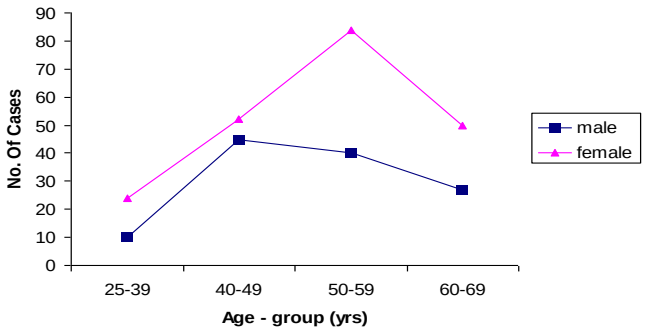

Fig.2. iIllustrates the age - groupwise distribution of the elephantoid subjects.

IV. Discussion

Lymphatic filariasis is a problematic vector – borne infection [30]. It affects 119 million people living in 73 countries and India accounts for 40% of the global prevalence of infection [9]. Elephantiasis, a complication of filariasis is the most common infection induced disability in the present days [31].

It is unable to confirm the prevalence of filariasis among different sexes. Previous studies [9 – 13] have shown that women have a lower prevalence of filariasis. But, one recent study [32] reports more infection among females. It is true in our study too. Lymphedema is a common chronic manifestations in lymphatic filariasis, the incidence and severity is associated with increasing age [12, 13, 33]. Our study corroborates these findings.

There is no concrete proof for the relationship between blood groups and filarial infection and its prevalence. One study explains the 'B' blood group specific prevalence of filariasis [34], the other study quotes the 'AB' blood group predominent occurrence of filariasis [35] and another one finds the link between 'A' blood group specific prevalence of filarial infection [36]. But, a majority of our filarial subjects are with 'O' blood group and elephantoids are B' blood group subjects.

In some cases, elephantiasis is accompanied by secondary infections caused by certain bacteria and fungi [8, 37] which cause even more vessel damage and worsening of the lymphedema [38]. Secondary infection exists in 10% of our elephantoid cases, where most of the cases (i.e.) 61% are men.

Previous studies indicate the higher age specific (>20yrs) incidence of filarial infection [10 – 13], but it is not true in our study, where the lowest age of filarial victim is 11 yrs. Similar observations have also been made in elephantoids by previous researchers [12, 13]. Our study also shows similar findings.

Earlier report says there is no change in Hb level, total and differential leucocyte count in filarial / elephantoid cases [39]. Another study mentions about a significant reduction of neutrophil percentage and an increase of lymphocyte and eosinophils [40] and ESR [16] in filariasis. A marginal level of decrease of Hb, total leucocyte count, a noticeable level of

decrease of neutrophils, an appreciable level of increase of lymphocytes, ESR and eosinophils are also seen in our filarial and elephantoid patients.

Humans with lymphatic filariasis generate active polyclonal immunoglobulins [17, 18, 41, 42] and the titres will be more in elephantoid and tropical pulmonary eosinophilia syndrome cases too [18, 43]. It is absolutely true in our subjects also. Large scale epidemiological studies are must to confirm the role of filarial infection and its impact on man.

V. CONCLUSION

Human lymphatic filarial infection and the related disease manifestations are not a curse, but lack of basic amenities and adequate knowledge on filariasis among the poor, careless attitude to mosquito bite, the existing human parasite carriers, frequency of mosquito bite, geographical / topographical / ecological conditions of the settlements, floating population (especially travellers and labourers) between Kanyakumari district and the adjoining filarial endemic zones in Kerala State, the 'hosts' immunity against infection and above all parasites' and hosts' immune responses aggravates filariasis tremendously. The present study reveals female sex specific, age un–related, 'O' blood group predominant and a very low prevalence of filariasis. Altered blood cells count, marginal level of anemia, elevated level of ESR, and high titres of IgG and IgE antibodies in both filarial and elephantoid subjects are the highlights of the study. Filarial / elephantoid survey provides the basic information about the disease(s) status which are utmost important for future surveillance measures.

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TABLE IV. EXPLAINS SOME OF THE MEASURABLE PARAMETERS IN FILARIASIS AND ELEPHANTIASIS SUBJECTS. (FILARIASIS, ELEPHANTIASIS AND ENDEMIC NORMAL SUBJECTS ARE 24; 4 MALES + 4 FEMALES IN EACH CATEGORY). (VALUES ARE ± SD OF 4 REPLICATES).

Parameter (s)	Sample	Male	Female
Total count	1.control	8069.25 ±33.13	8056.2 ±28.65
	2.filarial	8048±12.81^{S}	8054±20.02^{S}
	3.elephantoid	8039.75±12.34^{S}	8056.25±21.17^{S}
WBC	1.control	5013.75±49.13	5014±8.94
	2.filarial	6068.5 ±40.53^{S}	6110±45.64^{S}
	3.elephantoid	5025 ±21.51^{NS}	5093 ±20.51^{S}
Hb	1.control	15.98±0.15	12.88 0.19
	2.filarial	11.9± 0.02^{S}	11.53± 0.24^{S}
	3.elephantoid	11.95± 0.11^{S}	11.58± 0.15^{S}
ESR	1.control	8.75± 0.43	12.5 ±0.5
	2.filarial	32.25 ±0.43^{S}	35.25 ±1.33^{S}
	3.elephantoid	39 ±0^{S}	40.5± 0.5^{S}
neutrophil	1.control	40.75± 0.83	41.25± 0.83
	2.filarial	37.75± 0.43^{S}	37±0.71^{S}
	3.elephantoid	38.25± 0.43^{S}	38 ±0.71^{S}
lymphocytes	1.control	34.5± 0.5	34.5± 0.5
	2.filarial	44.25 ±0.43^{S}	47.5 ±0.5^{S}
	3.elephantoid	46.25 ±0.43^{S}	47 ±0.71^{S}
eosinophils	1.control	3.67± 0.47	4 ±0
	2.filarial	17 ± 1^{S}	15.25 0.43^{S}
	3.elephantoid	15.25 ± 0.43^{S}	15.25± 0.43^{S}
IgG	1.control	1564.5± 14.99	1578.75 ±10.18
	2.filarial	2255± 9.64^{S}	2321.25 ±19.31^{S}
	3.elephantoid	2377.75 ±8.96^{S}	2361 ± 45.24^{S}
IgE	1.control	189.5 ± 14.99	189.75± 4.02
	2.filarial	2040.4 ± 9.64^{S}	2156.25± 30.35^{S}
	3.elephantoid	2391 ±8.96^{S}	2222 ± 64.74^{S}

t -test : Calculated t-value is greater than tabulated t-value = significant^{S}
CALCULATED T-VALUE IS LESS THAN TABULATED T-VALUE = NOT SIGNIFICANT^{NS}

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