Original Article

Clinicodemographic Profile of Tropical Pulmonary Eosinophilia in a Tertiary Care Institute of Bihar

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Abstract

Background: Tropical pulmonary eosinophilia (TPE) is a type of eosinophilic lung disease, and it is associated with a hypersensitivity response to Wuchereria bancrofti and Brugia malayi's microfilariae. Any systemic data regarding its clinical, demographic, and radiological profile in patients of this part of the world are sparse. This study aimed to study the clinical and demographic profile of TPE patients in this geographical area. **Materials and Methods:** This is a prospective observational study done over 1 year period in patients with TPE-like features in a tertiary care center of Bihar. After appropriate clinical and blood examination, absolute eosinophil count (AEC), serum total immunoglobulin E (IgE), spirometry, filarial antigen, and filarial antibody and chest radiology were done. **Results:** Among 77 cases of TPE, 54 were male (70.1%) and 23 were female (29.9%), in a ratio of 2.35:1. The majority of cases 43 (55.9%) were found in age less than 30 years. Most of our participants were students 28 (36.4%), homemakers 19 (24.7%), and farmers 17 (22.1%). The most common clinical feature was cough 77 (100%). Filarial antibody was raised in all (100%) while antigen was positive in 96.1%. Chest radiology was normal in 71.4%. Mean AEC and IgE ± standard deviation were 6730.71 + 4671.12 and 7983.14 ± 7279.60 kU/L, respectively. Spirometric findings were mild restriction 25 (32.5%). **Conclusion:** The prevalence of TPE is supposed to be higher in endemic areas. The patient should be evaluated in detail if having raised eosinophil count (>3000/mm^3) with increased IgE level (>1000 kU/L) along with suggestive clinical features. Timely diagnosis and treatment can cure the disease and prevent its complications.

Keywords: Absolute eosinophil count, filarial antigen, immunoglobulin E, tropical pulmonary eosinophilia

Background

Tropical pulmonary eosinophilia (TPE) is a hypersensitivity reaction to the Wuchereria bancrofti and Brugia malayi's microfilariae trapped in the pulmonary microcirculation.[1,2] Mosquitoes are a vector for Lymphatic filariasis. TPE is endemic in the tropical and subtropical parts of countries such as Africa, Asia, South America, and Oceania.[1-3]

It has been reported from the coastal regions of India from West Bengal to Tamil Nadu and Maharashtra to Kerala.[4] The disease prevalence also varied from 9.9% among jail inmates in Patna[5] to 0.5% among children of Tamil Nadu.[6] The term TPE was coined in India for a group of clinical features consisting of cough, fever, wheezing, eosinophilia, and bilateral lung mottling on chest radiograph by Weingarten in 1943.[7]

Less than 1% of patients with lymphatic filariasis develop TPE. The disease is more common in the age group of 15–40 years, with a male-to-female ratio of 4:1.[4,8] It predominantly affects the lungs, but few studies reported about 7% of patients showed nonpulmonary manifestations.[4,9]

Cough is the predominant clinical feature followed by wheezing, dyspnea, and chest pain. Symptoms are primarily at night but may present during the day.[4,10] On examination, wheeze and crackles are predominant findings.[4]

Laboratory findings consist of marked eosinophilia >3000/μm, rising to 80,000/μm.[10-12] Elevated values of erythrocyte sedimentation rate and raised filarial-specific immunoglobulin E (IgE) and immunoglobulin G (IgG)

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and serum IgE were also found in TPE.[13-15] Chest radiograph may be normal (20%) or have reticulonodular opacity predominantly in mid to lower zones or miliary mottling.[4,16,17] Computerized tomography scan findings are miliary mottling and interstitial shadows, bronchiectasis, cavitation, consolidation, air trapping, or pleural effusions.[18] Spirometry of TPE was reported to be obstructive, mixed, restrictive.[4] Another study reported decreased transfer factor for carbon monoxide (TLCO).[19] This study aimed to study the clinical and demographic profile of TPE patients in this geographical area.

Materials and Methods

The study was a cross-sectional observational study of prospective type. Ethical clearance was taken from the Institutional ethics committee. Patients of TPE presented to pulmonary medicine outpatient department and inpatient department between June 2020 and May 2021 were included after informed consent.

After taking detailed clinical history (like any history of cough, shortness of breath, chest pain, and fever) and demographic data, patients were clinically examined (like any presence of crepitations and wheezing) and subjected to routine blood biochemistry, chest X-Ray/high-resolution computed tomography thorax, and spirometry. The data of all variables of interest were collected.

Inclusion criteria:

1. Patient age >10 years
2. History of cough, wheezing, and dyspnea
3. Chest radiograph showing reticulonodular opacity or miliary mottling
4. Absolute eosinophil count (AEC) >3000/mm^3
5. Elevated serum IgE (>1000 kU/L)
6. Positive filarial specific IgG and IgE
7. Positive filarial antigen.

Exclusion criteria:

1. Pregnancy
2. Age <10 years
3. History of having received DEC during the past 6 months, allergic reaction to drugs, and/or systemic steroid intake for more than 5 days in the previous 4 weeks
4. History of worm infestation, pulmonary tuberculosis, pneumonia, bronchial asthma, and chronic obstructive pulmonary disease.

Any patient with a history and clinical examinations suggestive of TPE were subjected to spirometry, AEC, total IgE, filarial antigen, and filarial antibody. Total IgE levels were calculated by fluoroenzyme immunoassay method, filarial antigen by immunochromatography, and filarial antibody by immunochromatography.

Data were analyzed using the SPSS software for Microsoft Windows (version 2021; SPSS Inc.; IBM, USA.) Descriptive analysis was done using mean with standard deviation (SD), median with range, or number (percentage). The differences between variables were analyzed using the Kruskal–Wallis test where required.

Observation and Results

Among 77 cases of TPE, 54 were male (70.1%) and 23 were female (29.9%) in a ratio of 2.35:1. The majority of cases 43 (55.9%) were <30 years of age (male cases [35.1%] and female cases [15.6%]). Out of 77 cases, 46 (59.7%) lived in villages, while 31 (40.3%) lived in cities. Most of our subjects were students 28 (36.4%), followed by homemakers 19 (24.7%) and farmers 17 (22.1%) [Table 1].

Most common symptoms were cough 77 (100%), productive in 10 (13%) and nonproductive nocturnal in 67 (87%) followed by dyspnea 73 (94.8%). The most common finding on physical examination was wheeze 70 (90.0%) [Table 2 and Figure 1].

Filarial antibody was raised in all patients (100%), whereas filarial antigen was positive in 74 (96.1%) patients. Chest radiology was normal in 55 (71.4%), interstitial pattern 10 (13%) nodular 10 (13%), and bronchiectasis in 2 (2.6%) [Table 3 and Figure 2].

Mean AEC 6730.71 ± 4671.12 (male 6866.30 ± 4688.70 female 6412.39 ± 4718.44) [Table 3 and Figure 3]. The mean IgE ± SD of total cases was 7983.14 ± 7279.60 kU/L (range 1023–44567) (male 7989.39 ± 7772.19 female 7968.48 ± 6126.9). 55% of these cases had IgE levels above 5000 kU/L [Table 3 and Figure 4]. Spirometric findings were mild restriction 25 (32.5%) followed by mild 18 (23.4%) and moderate 13 (16.9%) obstruction [Table 3 and Figure 5]. The mean ± SD. of forced vital capacity (FVC), forced expiratory volume in 1 sec (FEV1), and FEV1/FVC of all cases were 2.02 ± 0.84; 2.71 ± 0.87, and 73.6 ± 12.08, respectively [Figure 6].

Discussion

This study was intended to assess the clinicodemographic profile of filarial TPE. In our study, 77 cases of TPE were enrolled, 54 were male (70.1%) and 23 were female (29.9%) (male: female = 2.35:1). Similar results were seen in other studies.[2,18,20-22]

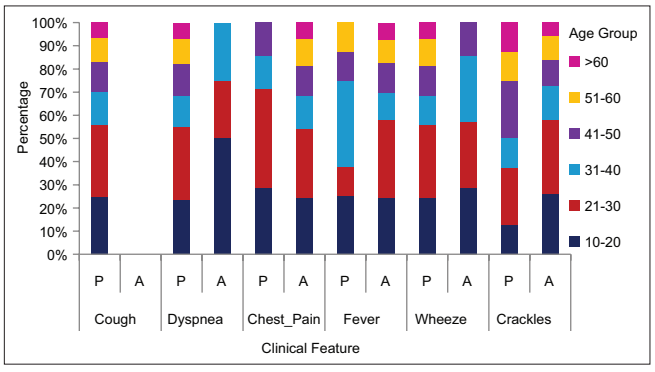

Figure 1: Clinical features of study population (P-Present A-Absent)

Table 1: Epidemiological profile of study population

Gender	Locality		Occupation					
	Rural	Urban	Housewife	Farmer	Student	Clerk	Priest	Labor
	46 (59.7%)	31 (40.3%)	19 (24.7%)	17 (22.1%)	28 (36.4%)	11 (14.3%)	1 (1.3%)	1 (1.3%)
Male 54 (70.1)	34 (44.1)	20 (26)	0	17 (22.1)	24 (31.2)	11 (14.3)	1 (1.3)	1 (1.3)
Female 23 (29.9)	12 (15.6)	11 (14.3)	19 (24.7)	0	4 (5.2)	0	0	0

Table 2: Clinical features of study population

Age-group		Clinical feature								
		Cough 77 (100%)				Dyspnea 73 (94.8%)	Chest-pain 7 (9.1%)	Fever 8 (10.4%)	Wheeze 70 (90.9%)	Crepitation 8 (10.4%)
		Productive 10 (13%)		Nonproductive 67 (87%)						
Male 54	Female 23	5 (50)	5 (50)	49 (63)	18 (37)	50 (93), 23 (100)	6 (11), 1 (4)	5 (9), 3 (13)	47 (87), 23 (100)	7 (13), 1 (4)
10-20		1 (5.3)		18 (94.7)		17 (22.1)	2 (2.6)	2 (2.6)	17 (22.1)	1 (1.3)
		1, 0		15, 3		14, 3	2, 0	2, 0	14, 3	1, 0
21-30		2 (8.3)		22 (91.7)		23 (29.9)	3 (3.9)	1 (1.3)	22 (28.6)	2 (2.6)
		1, 1		14, 8		14, 9	3, 0	0, 1	13, 9	2, 0
31-40		1 (9.1)		10 (90.8)		10 (13)	1 (1.3)	3 (3.9)	9 (11.7)	1 (1.3)
		1, 0		9, 1		9, 1	1, 0	3, 0	8, 1	1, 0
41-50		2 (20)		8 (80)		10 (13)	1 (1.3)	1 (1.3)	9 (11.7)	2 (2.6)
		0, 2		6, 2		6, 4	0, 1	0, 1	5, 4	2, 0
51-60		2 (25)		6 (75)		8 (10.4)	0	1 (1.3)	8 (10.4)	1 (1.3)
		1, 1		2, 4		3, 5	0, 0	0, 1	3, 5	0, 1
>60		2 (40)		3 (60)		5 (6.5)	0	0	5 (6.5)	1 (1.3)
		1, 1		3, 0		4, 1	0, 0	0, 0	4, 1	1, 0

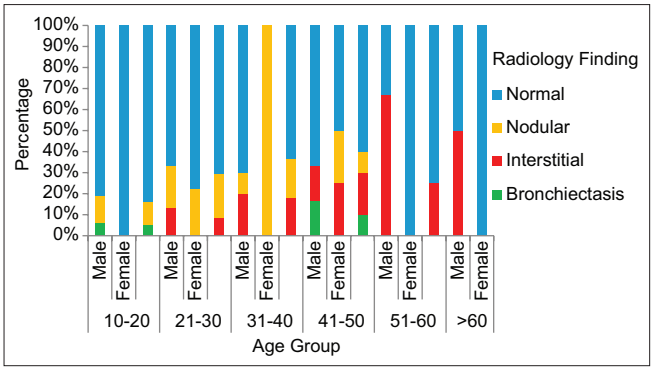

Figure 2: Chest radiology finding of study population

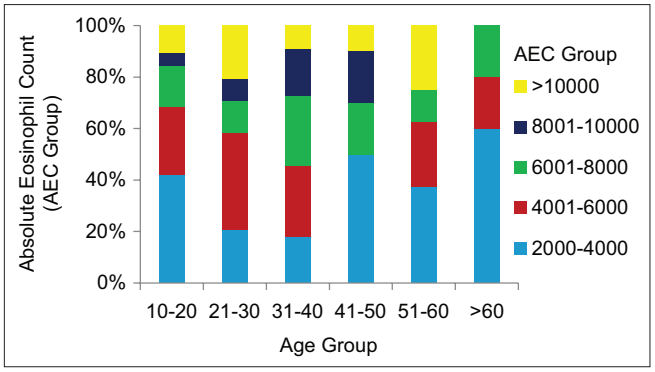

Figure 3: Absolute eosinophil count of the study population

In our study, the mean age ± SD of cases was 33.38 ± 15.13 (range14–69 years).69% of total cases (41 [76%] males and 12 [52%] females) were <30 years, and five (6.5%) patients were more than 60 years. The mean age was 31.31 ± 14.79 for males and 38.22 ± 15.21 for female cases. The findings of our study show similarities to previous studies.[20-22,23] In our study, the most common clinical features were cough in 100% cases (dry 87% and productive, 13%) followed by shortness of breath (94.8%), wheezing (90.1%), chest pain (9.1%), and fever (10.4%). The frequency of symptoms showed a similar correlation with other studies.[2,20,22,23]

The mean AEC ± SD of cases was 730.71 ± 4671.12/mm3 (range 3010–24718) in this study. In 56% of patients AEC level was more than 5000/mm3. Similar result of mean AEC ± SD was found by Kumar and Mourya 9,829.64 ± 12,690.18/mm3 (range 2550–26,488),[20] Vijayan *et al*. 9.18 ± 0.66 × 109/L (range 3010–23,500),[23] Sandhu *et al*. 9,401 ± 8,556/mm3 (range

Table 3: Laboratory parameter of study population

Age group	PFT (%)						Lab parameter		Chest X-ray (%)			
	Mild obstruction	Moderate obstruction	Mild restriction	Moderate restriction	Mixed	Normal	Total IgE	AEC	Interstitial	Nodular	Bronchiectasis	Normal
10-20	6 (7.8)	3 (3.9)	5 (6.5)	0	1 (1.3)	4 (5.2)	7880.42±5027.51	6248.74±5114.42	0	2 (2.6)	1 (1.3)	16 (20.8)
21-30	6 (7.8)	3 (3.9)	9 (11.7)	2 (2.6)	1 (1.3)	3 (3.9)	9245.83±8051.21	7340.83±4836.13	2 (2.6)	5 (6.5)	0	17 (22.1)
31-40	2 (2.6)	2 (2.6)	3 (3.9)	2 (2.6)	0	2 (2.6)	10,444.78±12651.62	6284.00±2374.62	2 (2.6)	2 (2.6)	0	7 (9.1)
41-50	2 (2.6)	2 (2.6)	4 (5.2)	1 (1.3)	1 (1.3)	0	5796.86±2917.61	7488.80±6528.73	2 (2.6)	1 (1.3)	1 (1.3)	6 (7.8)
51-60	1 (1.3)	3 (3.9)	2 (2.6)	1 (1.3)	1 (1.3)	0	5567.03±4722.91	6641.25±4806.16	2 (2.6)	0	0	6 (7.8)
>60	1 (1.3)	0	2 (2.6)	1 (1.3)	1 (1.3)	0	5135.81±1418.35	4559.40±1179.74	2 (2.6)	0	0	3 (3.9)

AEC: Absolute eosinophil count, PFT: Pulmonary function test

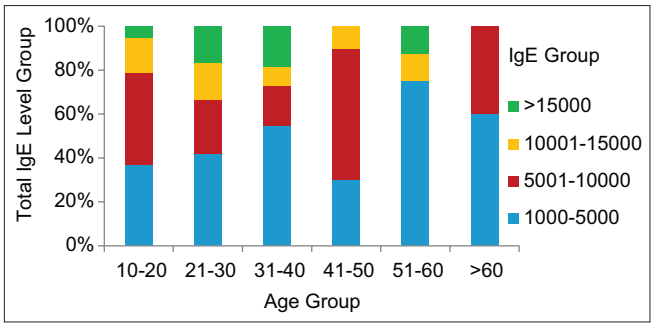

Figure 4: Total IgE level of the study population

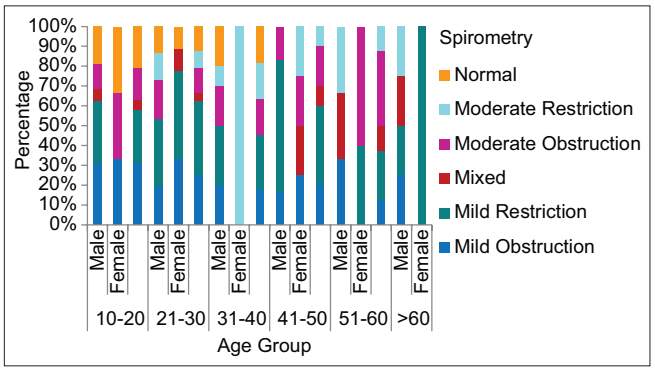

Figure 5: Spirometry category of the study population

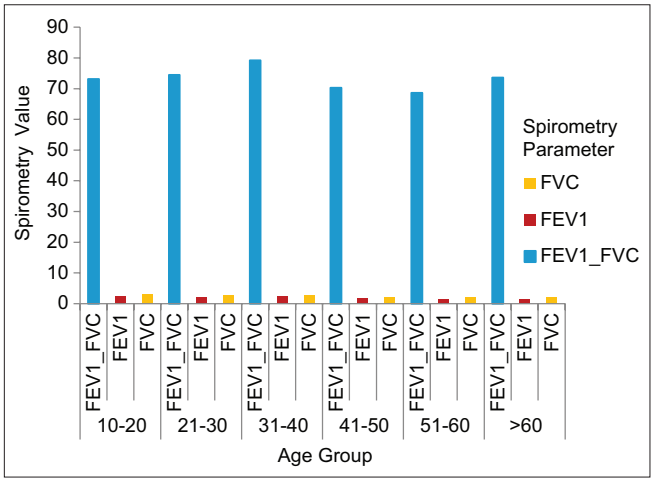

Figure 6: Spirometric parameter of the study population

2500–30,750),[18] and Sharma *et al*. 14,880 ± 18,710/mm3 (range 8142–21,618)[24] in their studies. Vijayan *et al*. also found the AEC level more than 5000/mm3 in 90% of their cases,[23] which is similar to our study.

In the present study, chest radiology was normal in 55 (71.4%), interstitial pattern 10 (13%) nodular 10 (13%), and bronchiectasis in 2 (2.6%).[4] Our finding is in correlation with previous studies.[4,18,25]

Spirometric findings were mild restriction 25 (32.5%) followed by mild 18 (23.4%) and moderate 13 (16.9%) obstruction. The finding of this study is similar to Udwadia and Herzog[4]

Mean ± S. D. of FEV1/FVC, FEV1and FVC of patients was 73.6 ± 12.08, 2.71 ± 0.87, and 2.02 ± 0.84, respectively. Similar results were seen by Kumar and Mourya the mean ± S. D. of FEV1/FVC, FEV1, and FVC were 79.69 ± 12.41, 2.31 ± 0.75, and 2.95 ± 0.91, respectively.[20] The maximum mean ± S. D. of FEV1 and FVC was found in the age group of 31–40 years, and the maximum mean ± S. D. of FEV1/FVC was seen in 10–20 years of age group. Kumar and Mourya found similar findings in their study. The maximum mean values of FVC and FEV1 were seen in the 21–30 years of age group, and the maximum mean value of FEV1/FVC was between 10 and 20 years of age.[20]

Limitations of study

The study's limitations were single-centered study, a small sample size, and filarial antigen detection by the alere filariasis test strip. It is a qualitative test that detects circulating filarial antigen of Wuchereria bancrofti, not brugia malayia.

Conclusion

The prevalence of TPE is supposed to be higher in endemic areas. Since our locality is a filarial endemic area, TPE should always be considered if the patient presents with dyspnea or wheezing and cough. We found 70% male and 30% females in a ratio of 2.35:1. The majority of the cases were <30 years of age and living in villages. Most of them were students, followed by homemakers and farmers. Predominant clinical features were cough, followed by dyspnea and wheeze.

Clinicians should evaluate the patient in detail if they have raised AEC, increased IgE level, and clinical features of TPE. The wide availability of serological tests will result in a timely diagnosis. If treatment is started on time, we can cure the disease and prevent its complications. Spirometry would help us assess lung function and response to treatment.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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