



Pulmonary Medicine

A STUDY ON THE SPIROMETRIC VARIABLES AND THEIR RELATION TO THE EXTENT OF DISEASE IN PATIENTS WITH BRONCHIECTASIS IN A TERTIARY CARE CENTRE IN CENTRAL KERALA

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ABSTRACT **BACKGROUND:** Bronchiectasis is often a neglected disease. Aim of this study is to analyse the spirometric variables of patients with bronchiectasis and also to assess the effects of extent of disease. **MATERIALS AND METHODS:** A cross sectional study was conducted in the Department of Pulmonary medicine in Government Medical College, Kottayam on patients with HRCT evidence of bronchiectasis for a period of 12 months. A total of 70 patients were enrolled. Spirometry was done in these patients and analysed. The extent of disease detected from HRCT scan and sample population was grouped into those with 1-3 lobes involvement and 4-6 lobes involvement. **RESULTS:** A total of 70 patients were enrolled with a mean age 53.07 ± 13.06 years of with 60% females. 47% of the study population has restriction, 11 % had obstruction. 33% showed mixed pattern while 11% had normal spirometric values. 42.8% had FEV1 less than 70% which is an objective evidence of airway obstruction. **CONCLUSION** There is significant association between the FEV1%, FVC% AND MEFV% of predicted with the extent of the disease.

KEYWORDS : Bronchiectasis, Spirometry

INTRODUCTION

Bronchiectasis though considered as an orphan disease(1), it is not that rare. Patients with bronchiectasis have permanently damaged airways with inflammation and infections going on as vicious cycle(2). The effect of these changes of airway may be giving rise to the progressive dyspnea and wheeze in patients with bronchiectasis(3,4).

MATERIALS AND METHODS

After getting the institutional ethical committee clearance, a cross sectional study was conducted in the department of Pulmonary medicine, Government Medical College, Kottayam on patients with HRCT evidence of bronchiectasis. The period of study was twelve months from October 2016. Informed consent was taken. Patients who are very sick, or having significant medical co-morbidities that may affect spirometry measurements were excluded. Any patient having acute infective exacerbation was treated and spirometry was done only in stable non infective patients. Spirometry was done in the department PFT lab by an experienced technician as per guidelines using a Vitalograph.(model 6800,calibrated) .The extent and morphology of Bronchiectasis was assessed from the HRCT. The spirometric variables and other results were tabulated in Excel sheet and appropriate statistical methods applied.

Table 1: Extent and morphology of bronchiectasis

Side	Cystic	Cylindrical	Varicose	Traction	Affected	Total lobes	Percentage
Right	72	16	7	25	120	210	57.1%
Left	55	14	6	21	96	210	45.7%
Total	127	30	13	46	216	420	51.4%
Percentage	58.79	13.88	4.98	21.29	100		

Thus the most common pattern observed was cystic bronchiectasis. The least common pattern was varicose type. The most involved lobe was left lower lobe and the least involved was left upper lobe. The right middle lobe involvement predominated in the right side of the lung, standing next to left lower lobe in the whole series.

Functional status

Table 2: Mean values of spirometric variables

	Mean	Std Deviation
FEV1	1.16	0.67
FEV1%	46.84	15.94
FVC	1.66	0.67
FVC%	53.66	15.76
MEF	25.58	13.66
MEFV%	0.96	0.47
FEVR	71.6	1.46

RESULTS AND DISCUSSION

Mean age of the study population was 53.07 ± 13.06 years with a minimum of 18 and a maximum of 79. Considering gender distribution, 40% were males, and 60 % were females. Maximum cases were found in the age group 41-60 in females and among males it was in 51 – 70 age groups. The gender distribution of the study population showed female predominance with 60% being females.

RADIOLOGICAL PATTERN AND DISTRIBUTION

The HRCT patterns(3,4) and distribution of bronchiectasis were studied in detail. For the convenience of the study and for the calculation purpose each lung was considered to have 3 lobes each ie upper lobe, middle/ lingular and lower. For zonal distribution, upper lobes are considered to be in the upper zone and, middle/ lingular and lower lobes are considered as lower zone. The results were as follows. Mean lobar involvement was 3 ± 1.48 . Bilateral lung involvement was seen in 75.7% of study population. Multi lobar disease was noted in 82.9% of the study population. All 6 lobes were affected in 5 among them. 4 or more lobes were affected in 28 individuals who constituted 40% of the study population. All lobes in the right side were almost equally affected, but slightly higher involvement of the right middle lobe was noted.

Functional status of the study population assessed with spirometry. Patients were further categorised into obstructive, restrictive, mixed and normal spirometric pattern according to percentage of observed values to the predicted FVC, FEV1 and FER.

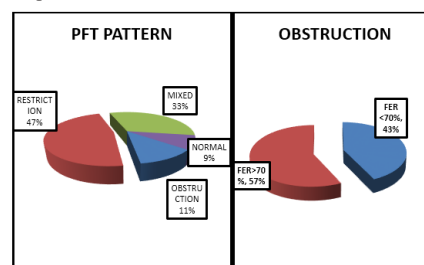


Figure 1: Spirometric pattern of the study population.

47% of the study population has restriction, 11 % had obstruction. 33% showed mixed pattern while 11% had normal spirometric values. FER percentage of less than 70% is an objective evidence of airway obstruction and it was noted in 42.8% of the study population (Figure1)

Table 3: Extent of lung involvement with function

	Risk factor	N	Mean	Std. Deviation	Std. Error Mean	P value
FEV1 %	1-3 lobes	42	50.75	16.74	2.58	0.01
	4-6 lobes	28	40.99	12.83	2.42	
FVC %	1-3 lobes	42	58.9	15.6	2.41	0.001
	4-6 lobes	28	45.8	12.6	2.38	
MEFV %	1-3 lobes	42	32.68	14.73	2.27	0.002
	4-6 lobes	28	22.45	9.07	1.71	

There is significant decrease in FEV1% of the study population with more extensive lung damage with bronchiectasis. The mean FEV1% of the group with 1-3 lobes involvement was 16.75 and was 12.0 in those with involvement of 4 or more lobes. The difference in this means is significant with a p value of 0.01. Similarly forced vital capacity and mid expiratory flow volume percentages were also decreased in those with extensive disease (p value 0.001 and 0.002)

Considering the zonal distribution of the disease, three groups were created. These included an upper zone disease group, where only upper lobes were affected, a lower zone disease group where middle lobe, lingula and lower lobes were affected and upper lobes were spared and both zone disease group, where both upper lobes and lower lobes were affected.

Zone	Frequency	Percentage
Upper zone	9	12.9
Lower zone	31	44.2
Both zones	30	42.9
Total	70	100

DISCUSSION

75.2% of the study population had bilateral disease with right predominance noted in the current study. 82.8% had multilobar disease. The most affected in the left side was left lower lobe. Overall maximum involvement was seen in left lower lobe and least was seen in left upper lobe. The most common radiological pattern was cystic type followed by traction type. Radiological analysis of the Turkish study(5) population in 304 patients showed, bilateral lung involvement in 62.5 %, multilobar disease in 75.3 %. Similar to the current study, left lower lobe was the most common affected, left upper lobe was the least affected. But in the right side, unlike that in the current study where involvement of right sided lobes were comparable, right lower lobe was the most common affected.

Bilateral involvement was seen in 42% followed by right predominance (33%) in a study conducted by Prabhakar Rao et al in India(6). This study was conducted in 60 patients who had completed ATT. The subjects were in the age range of 17–69 years, of which majority were in the 31–50 years group (43.3%). This study showed a predominance of traction bronchiectasis.(6)

From the analysis of the spirometric variables, current study showed normal spirometry in 9%, obstruction in 11%, restriction in 47% and mixed pattern in 33%. Spirometric variables were further classified for those with obstruction and without obstruction, that is a value less than 70% of FEVR and it revealed that 42.8% of the study population had airway obstruction.

Spirometric measurements showed that 21.5 % had normal spirometry 46.7 % had obstructive, 8% had restrictive spirometry and 23.7 patients had mixed pattern in the Turkish study(5). Gothi et al described airflow obstruction in all the patients with bronchiectasis in his study conducted in India(4). Lung function pattern was found to be obstructive in 43.1% with 38% normal spirometry in another study. The obstruction in bronchiectasis can be due to a co- existant obstructive airway disorder like asthma or COPD also. Patients with documented airway obstruction are likely to improve symptomatically from bronchodilators or inhaled corticosteroids.(7,8)

The mean FEV1% predicted in those with 1-3 lobes involvement was 50.75 and those with 4-6 lobes involved was 40.56. This difference is significant with a p value of 0.01. Similar decrease was observed in the cases of forced vital capacity and mid expiratory flow volume percentages. (p 0.001 and p0.002)

CONCLUSION

The most common spirometric pattern observed was restriction followed by mixed pattern. 43 percentage of the study population showed objective evidence of airway obstruction. This is very important as these patients may improve symptomatically on proper treatment with bronchodilators and in selected cases with inhaled corticosteroids.

The extent of lung involvement has a significant effect on the spirometric variables also. The reduction in the pulmonary function as measured by FEV1,FVC and FEVR are well correlated with the extent of disease. Serial spirometric studies can be of help in assessing the pulmonary function status and progression of disease ,as well as to guide in management in patients with Bronchiectasis.

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