Original article:

Study of smoking Index, spirometry and severity of chronic lung disease

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ABSTRACT:

Introduction: It has been estimated that there are 45 million Asthma and COPD sufferers in India and this number is expected to increase to 57.2 million over the next decade according to National Centre for Macroeconomics and Health, Government of India. With this in mind present study was planned to study correlation between severity of smoking and lung diseases.

Methodology: 100 patients having respiratory complaints were selected randomly from OPD and were screened for various respiratory disorders (COPD ,Asthma ,ILD, Bronchiectasis, Post-infectious fibrosis, & Occupational lung diseases) by symptomatology, history, clinical examination, Chest X ray & spirometry.(Standard criteria were used for diagnosis of various respiratory disorders).The youngest was 20 yrs and the oldest was 65 years, mean age being 41 years. 64% were males and 36% were females. Dyspnea grading as per MMRC Scale showed 39% had grade I ,36% grade II and 11% grade III dyspnea.

Results: Using Correlation co-efficient test, highly significant inverse correlation was found between MMRC scale of dyspnea and FEV1%, i.e. as the scale of dyspnea increases, the FEV1 decreases. Using Correlation co-efficient test, highly significant inverse correlation was found between Smoking Index in pack years and FEV1%., i.e. as the Smoking index increases, the FEV1 decreases.

Key Words: *Smoking Index ,Chronic lung disease*

INTRODUCTION

It has been estimated that there are 45 million Asthma and COPD sufferers in India and this number is expected to increase to 57.2 million over the next decade according to National Centre for Macroeconomics and Health, Government of India. [(1)]. This health burden is much higher than other non-communicable diseases like Hypertension, Ischemic heart disease, Diabetes mellitus and Cancer[(2)]. Unfortunately, a large number of people suffering from obstructive airways disease (OAD) remain undiagnosed, untreated ,wrongly diagnosed , wrongly treated and undertreated. Clearly, a lot needs to be achieved to diagnose and treat our patients suffering from respiratory disorders better.

Lung is inhomogeneous both anatomically and physiologically. Pulmonary function is necessary to ascertain reserve in both health and in disease that involves either the lung or other organs of the body. Spirometry is a tool that not only helps in diagnosing respiratory disorders but also helps in monitoring their management. However, hardly 20% of general physicians and 50% of chest physicians avail this facility. More than 75% of asthma and COPD sufferers in India have never undergone spirometry testing. Spirometry is for dyspnoea as Electrocardiogram is for chest pain. It should be used by most primary and all chest physicians. It should be a part of all health assessment programmes. The doctors / technicians performing the test should

undergo proper training. Every centre should use infection control measures.

MATERIALS AND METHODS

100 patients having respiratory complaints were selected randomly from OPD and were screened for various respiratory disorders (COPD ,Asthma ,ILD, Bronchiectasis, Post-infectious fibrosis, & Occupational lung diseases) by symptomatology, history, clinical examination, Chest X ray & spirometry.(Standard criteria were used for diagnosis of various respiratory disorders). All instructions were given to the participants regarding the study and the procedure. All the tests were carried out in the Pulmonary Function laboratory between 9am and 12 noon. The Pulmonary function tests were performed on computerized Pulmonary Function Test machine manufactured by Masterscreen Diffusion Jaeger. Patients who were smokers and had Obstructive Ventilatory defect i.e. forced expiratory volume in one second (FEV1) and forced vital capacity (FVC) ratio less than 70% and FEV1 less than 80% with poor bronchodilator reversibility were labelled as COPD Patients having a history of recurrent rhinitis, urticaria or a family history of asthma and having an obstructive ventilatory defect with good bronchodilator reversibility were labelled as Bronchial Asthma. In patients with Restrictive ventilatory defects with decreased DLCO, having honey combing or ground glassing on HRCT thorax, were labelled as Interstitial lung disease Bronchiectasis was diagnosed on the of history of chronic cough with sputum with exertional breathlessness ; confirmed by High Resolution Computed Tomography (HRCT) thorax. Silicosis was diagnosed by history of exposure to offending agent (i.e. silica) at place of work and confirmed by imaging (chest X ray and HRCT thorax).Patients with a past history of tuberculosis or childhood history of pneumonia having a restrictive ventilatory defect and showing fibrotic changes on High Resolution Computed Tomography (HRCT) thorax were diagnosed as post-infectious fibrosis.

INCLUSION CRITERIA:

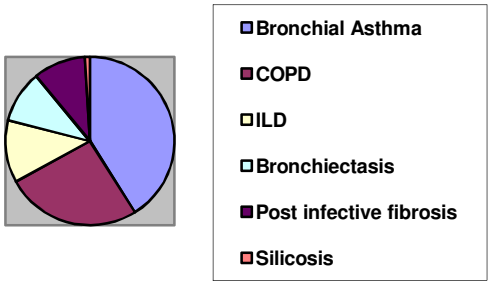
- Patients having various respiratory disorders
- Either gender
- Adults above the age of 18 years

EXCLUSION CRITERIA:

- Any respiratory exacerbation/ worsening of symptoms in the last 4 weeks
- Poor subject co-operation.
- Debilitated patients.
- Congestive cardiac failure, coronary artery disease, valvular heart disease.
- Sputum positive pulmonary tuberculosis.

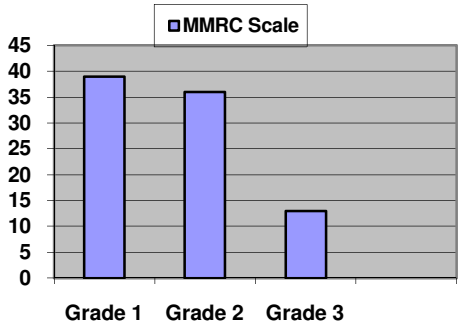
RESULTS

I)DISEASE WISE : Disease wise distribution showed that 41% Bronchial Asthma, 26% Chronic Obstructive Pulmonary Disease, 12% Interstitial Lung Disease,10% post-infectious fibrosis, 10% bronchiectasis and 1% had occupational lung disease.

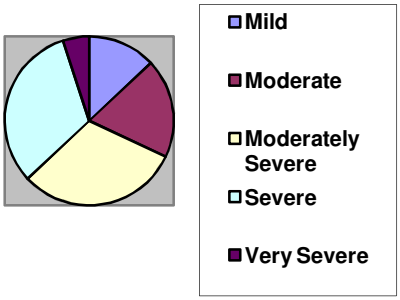


II)MMRC DYSPNEA SCALE WISE : Patients with dyspnea(86) were distributed as regards Modified Medical Research Council (MMRC) Scale.39 had grade I ,36 had grade II and 11 had grade III dyspnea.

Number of patients (n)	Correlation coefficient (r)	'p' value
86	-0.777	<0.01 (HS)



III)SEVERITY WISE : Distribution according to severity of Spirometric abnormality according to ATS/ERS 2005 guidelines- 13% mild, 19% moderate, 31% moderately severe, 32% severe, 5% very severe .



Correlation between MMRC Dyspnea Scale and FEV1%

Using Correlation co-efficient test, highly statistically significant inverse correlation was found between MMRC scale of dyspnea and FEV1%., i.e. as the scale of dyspnea increases, the FEV1 decreases.

Correlation Between Smoking Index and FEV1%

Using Correlation co-efficient test, highly statistically significant inverse correlation was found between smoking index and FEV1 i.e as the smoking index increases, the FEV1 decreases.

Number of patients (n)	Correlation coefficient (r)	'p' value
49	-0.973	<0.01 (HS)

DISCUSSION

Pulmonary Function Testing is one of the most useful tools in clinical practice today, having a wide application throughout the field of Medicine. Normal spirometry predicts a high likelihood of long-term survival whereas an abnormal spirometry indicates an adverse prognosis.

Spirometry is crucial in detection of airflow obstruction, in monitoring the responses to therapy and disease progression. Spirometry also plays a role in the diagnosis and management of restrictive lung diseases. Spirometry determines lung age and is an aid in smoking cessation. The purpose of this study was to assess the role of Pulmonary Function testing in not just diagnosing, but also treatment and monitoring of chronic lung diseases. In our study, patients attending the out-patient department of pulmonary unit of a tertiary care public hospital with respiratory complaints were screened by symptomatology, history, clinical examination and chest X-ray and spirometries were performed. The minimum age was 20 years and the maximum age was 65 years. The mean age was 41 years. In this study, the population of male patients was 64 % and female patients were 36 % showing a higher prevalence of respiratory disease in males. Of these 100 patients, 41 patients had Asthma, 26 COPD , 12

Interstitial lung disease , 10 Post Infectious fibrosis , 10 Bronchiectasis and 1 had silicosis. Based on the ATS/ERS guidelines (3) the subjects were classified as mild,moderate, moderately severe and very severe according to FEV1 %.31% had moderately severe disease, 32% had severe disease,32% had mild to moderate disease. 5% of the patients had very severe disease. In the present study, we used the correlation co-efficient test to study the correlation between Modified Medical Research Council (MMRC) Dyspnoea scale and FEV1 % predicted. It was observed that there is a highly significant inverse correlation between MMRC dyspnoea scale and FEV1%.i.e.as the MMRC dyspnoea scale increases, the FEV1% predicted decreases ($r= -0.77$, $p<0.01$) . Donald et al (1996) (4) and Safwat T et al (2009) (5) have shown a significant inverse correlation between FEV1% and dyspnoea grade in COPD. In our study, we studied the correlation between Smoking Index in Pack years and FEV1 % using the correlation co-efficient test. We observed a highly significant inverse correlation between Smoking Index in pack years and FEV1 %., i.e., as the Smoking Index increased, the FEV1 decreased ($r= -0.97$, $p<0.01$). Similar results were obtained by Targowski T et al (2005) (6) who showed a significant relationship between the Smoking index (expressed in pack-years) and disease severity.Similar results were obtained by Shivanand KG et al (7)

CONCLUSIONS

A highly significant inverse correlation was found between MMRC scale of dyspnea and FEV1%, i.e. as the scale of dyspnea increases, the FEV1 decreases. A highly significant inverse correlation was found between Smoking in pack years and FEV1%, i.e. as the Smoking index increases, the FEV1 decreases.

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Date of submission: 22 June 2013	Date of Provisional acceptance: 30 June 2013
Date of Final acceptance: 27 July 2013	Date of Publication: 04 September 2013
Source of support: Nil	Conflict of Interest: Nil