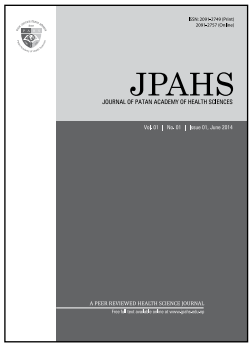

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Spirometry Findings in Patients with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Introductions: Clinical diagnosis of chronic obstructive pulmonary disease is often not accurate and treated for prolong duration. This study explores the use of pulmonary function test to confirm the diagnosis and further management of such patients.

Methods: This was a cross sectional study conducted at Patan Hospital, Patan Academy of Health Sciences, Nepal. All patients coming for spirometry between June 2012 and May 2013 with the clinical diagnosis of chronic obstructive pulmonary disease were enrolled in the study.

Results: Out of 338 patients with clinical diagnosis of chronic obstructive pulmonary disease that underwent spirometry, 80 (23.7%) patients had ratio of forced expiratory volume in one second and forced vital capacity less than 70%. Out of these 80 patients, 50 (14.8%) had irreversible airway obstruction and 30 (8.9%) had reversible airway obstruction. Patient with normal spirometry findings was 258(76.3%).

Conclusions: Clinically diagnosed chronic obstructive pulmonary disease is best confirmed by spirometry for optimum management.

Keywords: chronic obstructive pulmonary disease, pulmonary function, spirometry

Plain Language Summary

The study was done to see whether the clinical diagnosis of COPD is accurate of not. The study found that most of the patient diagnosed as COPD did not have the disease on spirometry. So, diagnosis of COPD should always be aided by spirometry before starting long term treatment.

INTRODUCTIONS

According to 2008 Global initiative for chronic lung disease update, clinical diagnosis of Chronic Obstructive Pulmonary Disease (COPD) should be considered in any patient who has dyspnoea, chronic cough or sputum production, or a history of smoking. The diagnosis of COPD should be confirmed by spirometry.[1] A cohort in 2005[2] and 2006[3] showed that almost half of the patients diagnosed to be COPD clinically did not have the disease.

This study was designed to see the pulmonary function by spirometry for patients diagnosed clinically with COPD.

METHODS

This was a descriptive cross sectional study evaluating records of patients with COPD coming for spirometry at pulmonary function test unit of Patan Hospital, Patan Academy of Health Sciences (PAHS), Nepal between June 2012 and May 2013. These patients were clinically diagnosed as COPD in outpatient department of general practice and medical department. Ethical approval was taken from the institutional review committee of PAHS. Records of all patients consecutively registered at pulmonary function test unit were analyzed. Spriometry diagnosis of COPD was defined as ratio of forced expiratory volume in one second and forced vital capacity (FEV1/FVC) less than 0.70 and reversibility as post bronchodilator change in forced expiratory volume in one second (FEV1) more than 0.20 of predicted. Microsoft Access 2007 was used to record data and statistical analysis was done using SPSS 16.0. Student's t-test and chi square test were used, p value < 0.05 was taken as statistically significant.

RESULTS

Out of 409 patients referred for spirometry, 338 patients with clinical diagnosis of COPD were evaluated while 69 patients with other diagnoses like bronchial asthma, pneumonia were excluded from the study. Out of 338 study patients, 174 (51.5%) were male and 164 (41.5%) female. Mean age was 62.7 years, range 37 to 88 years. Smokers were 291 (86.1%) and non smokers 47 (39.9%).

Out of 338 clinically diagnosed COPD patients, 80 (23.7%) had FEV1/FVC ratio less than 70% while 258 (76.3%) patients had FEV1/FVC ratio more than 70%. Out of these 80 patients, 50 (14.8%) had irreversible airway obstruction and 30 (8.9%) had reversible airway obstruction. Mean FEV1/FVC, FEV1 and FVC of patients with irreversible airway obstruction was 59.7%, 41.4% 70.0% respectively of predicted values, those with reversible airway obstruction had 59.7%, 55.04%, 65.3% respectively of predicted values and those who did not require bronchodilator had 94.2%, 59.1% and 63.1% respectively of predicted values. The differences observed in these three groups were statistically significant for FEV1/FVC ($p<0.05$), FEV1 ($p<0.05$) and insignificant for FVC ($p=0.1$). Similarly in male mean FEV1/FVC, FEV1 and FVC were 86.02%, 50.6%, 59.7% respectively of predicted and in female 86.1%, 59.7% and 71.1% of respectively of predicted values. The difference in values for male and female was statistically not significant for FEV1/FVC ($p<=0.9$), FVC ($p=0.9$) and significant for FEV1 ($p=0.02$). On evaluation with non smoking status the values were 98.4%, 62.1%, 65.04% respectively of predicted values and with smoker it was 84.07%, 53.8% and 66.3% respectively of predicted values. The difference in smoker and nonsmoker was statistically significant for FEV1/FVC ($p<0.05$), FEV1 ($p=0.02$) and insignificant for FVC ($p=0.9$).

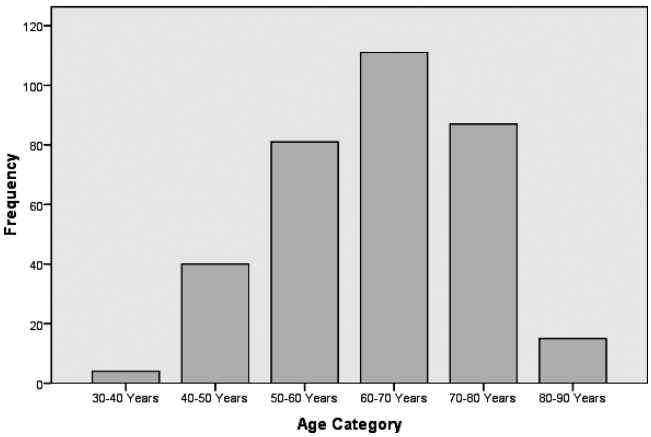

Figure 1. Frequency distribution in different age group in clinically diagnosed COPD patients (n=338)

Table 1. Difference in spirometry results in clinically diagnosed COPD patients (n=338) in relation to gender

Gender	PFT Diagnosis	FEV1/FVC % *	FEV1 % †	FVC % ‡
Female	Irreversible airway obstruction	59.5	37.7	69.9
	Reversible airway obstruction	59.7	37.02	63.3
	Normal §	93.6	54.4	58.6
Male	Irreversible airway obstruction	59.8	44.5	75.3
	Reversible airway obstruction	94.8	64.3	68.1
	Normal §	94.8	64.3	68.1

* p<0.9; † p<0.05; ‡ p<0.05; § Reversibility not checked

Table 2. Difference in spirometry results in clinically diagnosed COPD patients (n=338) in relation to smoking

Smoking status	PFT Diagnosis	FEV1/FVC % *	FEV1 % †	FVC % ‡
Smoker	Irreversible airway obstruction	59.7	41.0	69.4
	Reversible airway obstruction	59.0	43.7	78.2
	Normal*	92.6	58.0	62.8
Non Smoker	Irreversible airway obstruction	85.7	50.9	59.3
	Reversible airway obstruction	51.7	28.1	66.0
	Normal*	65.0	65.08	102.5

* p<0.05; † p=0.02; ‡ p<0.09; § Reversibility not checked

Evaluation of different age group and pulmonary function test showed no statistically significant difference on age category with respect to pulmonary function test results (FEV1/FVC: p=0.3, FEV1: p=0.09 and FVC: p=0.9).

DISCUSSIONS

Global initiative to prevent lung disease recommends spirometry for the diagnosis of COPD.[1] However, spirometry is underutilized in many parts of the world. In a study done in US, it was found that spirometry use was 66% in pediatricians, 47% in family practitioners and 60% in internal medicine.[4] Another study in Nigeria stated that knowledge and practice of spirometry were poor among hospital based Nigerian doctors because of unavailability of spirometry in most hospitals.[5] We found that 258 (76.3%) patients with clinical diagnosis of COPD had normal pulmonary function test result. This shows mismatch between clinical diagnosis and spirometry findings. To minimize unnecessary load and misuse of spirometry tests, these patients should be rigorously screened by proper clinical tool like COPD population screening questionnaire before sending for pulmonary function test.[6] In this line, US Preventive Services Task Force recommends against screening adults for COPD using spirometry following a systematic review of evidence of the benefits and harms and an assessment of the net benefit.[7]

A 2005 prospective cohort study in the United Kingdom assessed 125 participants with a previous clinical diagnosis of COPD. When spirometry was used to confirm the COPD diagnosis, only 61 (49%) met diagnostic criteria. Of the remaining participants, 25 (20%) had reversible airway obstruction, 5 (4%) had restrictive obstruction, and 34 (27%) had normal spirometry.[2] In our study, out of total clinically diagnosed COPD, only 80 (23.7%) had airway obstruction, of which 50 (14.8%) had irreversible and 30 (8.9%) had reversible airway obstruction. The number of patient with normal spirometry in our study was 258 (76.3%) in contrast to 34 (27%) in a cohort study mentioned above.[2] This raises the possibility of many patients having spirometry unnecessarily. In yet another cohort study, 184 of the 597 participants had a clinical diagnosis of chronic bronchitis or emphysema; 89 (48%) of the 184 were confirmed as having COPD with spirometry, while 95 (52%) did not meet the criteria for COPD.[3] This shows that not only in our study but in other parts of the world also many COPD patients are sent for spirometry unnecessarily.

Our study also highlighted the statistically significant difference between FEV1/FVC and FEV1 for normal, reversible and irreversible obstruction after controlling the possible confounders like age, sex and smoking status. So, spirometry can be used as a very good tool for diagnosis, grading and ongoing management of disease.

CONCLUSIONS

Clinical diagnosis of COPD needs to be confirmed by spirometry for ongoing management. It should however not be used for screening purpose. Other better tools like COPD questionnaire should be evaluated for screening tool.

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