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Research Article

Evaluate the Use of Spirometry for Diagnosis of COPD and Assessment of Its Severity

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Abstract: The Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD) has recommended spirometry as the gold standard for diagnosis of COPD in symptomatic individuals through spirometric testing that demonstrates irreversible airflow obstruction. Spirometry for case-finding diagnosis of all adults with persistent respiratory symptoms or having a history of exposure to pulmonary risk factors has been recommended in primary care settings for all current and former smokers who have persistent respiratory symptoms. The aim of this study was to evaluate the use of spirometry for diagnosis of COPD and assessment of its severity. A total of 50 subjects with pre-bronchodilator air flow obstruction underwent reversibility testing. Of these, 40 (80%) subjects had persistent airflow obstruction while 10 (20%) were no longer obstructed. For COPD patients, the Mean ± SD age was 58 ± 11 yrs. Of which 21 were current smokers; and the remaining 13 were ex-smokers. The Mean ± SD cigarettes smoked were 42 ± 29 pack-yrs. The Mean ± SD FEV_1 was 1.35 ± 0.52 L (55 ± 17% of predicted) and Mean ± SD FEV_1/FVC ratio was 0.55 ± 0.09 in these patients. These patients were classified according to GOLD classification in which 18 patients had severe, 11 patients had moderate, and 2 patients had mild and very severe COPD. Spirometry in addition to clinical examination improves COPD diagnostic accuracy compared to clinical examination alone and it is a useful diagnostic tool in individuals with symptoms suggestive of possible COPD.
Keywords: Chronic obstructive pulmonary disease, Asthma, Spirometry, FEV1/FEV, Smokers, Bronchodilator.

INTRODUCTION

It is aptly said that the patients of COPD have less years in their life and less life in their years and this disease is now a major concern for quality of life of the individual.

COPD kills more than 3 million people every year, making it the 4th largest cause of death in the world [1]. It has been estimated that by the year 2030, COPD will become the third biggest cause of death. Half a million people die every year due to COPD in India, which is over 4 times the number of people who die due to COPD in USA and Europe [2]. According to a report published by the Maharashtra State Health Resource Centre, COPD is the leading cause of death in Maharashtra, causing more deaths than those due to ischemic heart disease, stroke and diabetes all put together [3].

The Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD) has recommended spirometry as the gold standard for diagnosis of COPD in symptomatic individuals through spirometric testing that demonstrates irreversible airflow obstruction [4]. Spirometry for case-finding diagnosis and management of all adults with persistent respiratory symptoms or having a history of exposure to pulmonary risk factors has been recommended in primary care settings for all current and former smokers as well as never smokers who have persistent respiratory symptoms or have history of exposure to other COPD risk factors [5].

Role of spirometry in COPD requires basic understanding of spirometry, its importance in the management of COPD with knowledge of how to perform spirometry correctly and its interpretation (Chart). American Thoracic Society and European Respiratory Society guidelines (ATS/ERS guidelines) are used for acceptable and reproducible spirometry [6].

The United States Preventive Services Task Force, an independent panel of experts in primary care and prevention suggest spirometry evaluation in a person presenting with shortness of breath, chronic cough,

increased sputum production, wheezing, and/or a family history of alpha1-antitrypsin deficiency [7]. A combination of symptoms and spirometry may therefore be a more relevant way of diagnosing COPD in individuals exposed to the causative factor.

However, spirometry is not widely available and spirometric test results are not always optimally recorded or interpreted except when performed by experienced personnel [8].

Therefore, COPD remains poorly diagnosed or wrongly diagnosed by health care providers.

A number of recent publications have looked at the use of primary-care spirometry and reasons for its underuse, in particular addressing practical problems with delivery and interpretation of results [9, 10].

The aim of this study was to evaluate the use of spirometry for diagnosis of COPD and assessment of its severity.

MATERIALS AND METHODS

After obtaining approval from Institutional Ethics committee of PDVVPF's Medical College and Hospital, Ahmednagar research project was initiated & data collected over period of 3 months.

Patients of age more than 12 years presenting with chronic cough, dyspnea and history of smoking (current smokers and ex-smokers) were included in study. Immunocompromised patients and patients with specific infection like pneumonia, tuberculosis were excluded from this study. Patients were asked to omit the use of short-acting bronchodilators for 6 h and long-acting bronchodilators for 12 h before spirometry.

Autospirometer (Helios 40/RMS) used in the study facilitated the total valuation of lung function and was used for diagnosis and assessment of severity of lung disease.

After filling the vital data (age, height, smoking history and medications), subjects were first instructed in and then given a demonstration of the proper technique.Subjects vital capacity, forced vital capacity and maximum ventilator volume graphs were displayed on spirometer. Three such efforts were made for each recording and best was selected based on standardization of spirometry study based on ATS/ERS task force series [6]. The same spirometer was used throughout the study and the tests were performed by the same technician.

Bronchodilator reversibility testing was performed in subjects with pre-bronchodilator airflow obstruction defined as FEV1/ FVC <0.7 and/or FEV1 <80% predicted. In the test, 5 mg salbutamol and 500 mg ipratropium bromide, diluted in 2 mL 0.9% saline, were administered through a nebuliser until all the solution was inhaled (usually for about 10 min). Spirometry was then repeated after 45 min.

Data was recorded and analyzed using paired and unpaired t-test. Single variable data were analysed using the Chi-squared test. A p-value <0.05 was regarded as significant as mean and standard deviation.

RESULTS

A total of 50 subjects with pre-bronchodilator air flow obstruction underwent reversibility testing. Of these, 40(80%) subjects had persistent airflow obstruction while 10(20%) were no longer obstructed. Of these 10 subjects with no persistent airflow obstruction, 6 had FEV_1>80% of predicted.

Of the 50 patients, before reversibility there were 15 patients with provisional diagnosis of asthma and COPD with 20 patients not given the diagnosis. After post bronchodilator spirometry, 8 subjects received a new diagnosis of asthma and 22 a new diagnosis of COPD.34 patients were either newly diagnosed as having COPD or confirmed to have COPD. No subject with a pre-bronchodilator FEV1/FVC ratio < 0.63 reversed to normal.

Table 1: No. of Patients Post bronchodilator spirometry

Diagnosis before Spirometry	Diagnosis after Spirometry	Patients(n)
No Diagnosis (20)	Asthma	5
	COPD	15
Asthma (15)	Asthma	8
	COPD	7
COPD (15)	Asthma	3
	COPD	12
All diagnosis (50)	Asthma	16
	COPD	34

For COPD patients, the Mean ± SD age was 58 ± 11 yrs. Of which 21 were current smokers; and the remaining 13 were ex-smokers. The Mean ± SD cigarettes smoked were 42 ± 29 pack-yrs. The Mean ± SD $FEV_1$was 1.35 ± 0.52 L (55 ± 17% of predicted) and Mean ± SD FEV_1/FVC ratio was 0.55 ± 0.09 in these patients.

GOLD[4]recommends that the assessment of severity of COPD be based on a physiological variable, post bronchodilator FEV1% predicted as mild>80, moderate 50-80, severe 30-50 and very severe <30, "rule of 30-50-80".These patients were classified according to GOLD classification in which 18 patients had severe, 11 patients had moderate, and 2 patients had mild and very severe COPD (Table 2).

Table 2: Classification of Severity (GOLD Guidelines)

Severity of COPD	Post Bronchodialator FEV1	Patients(n)
Mild	>80 % Predicted	2
Moderate	50 – 80 % Predicted	18
Severe	30 – 50 % Predicted	11
Very Severe	<30% Predicted	2

Most current smokers were provided with smoking cessation advice and significantly more patients were prescribed anticholinergics, long-acting b-agonists and inhaled corticosteroids after spirometry had been performed.

DISCUSSION

A previous study [11] has shown that primary-care spirometry testing increases the number of individuals correctly diagnosed as having COPD. The present data show the majority of individuals who had obstructive spirometry results either received a diagnosis or had their diagnosis changed. The impact of this was not just on the COPD population, as one in six patients were newly diagnosed as having asthma.

The current study also clearly demonstrates the value of bronchodilator reversibility testing in subjects with obstructive spirometry. Using information recorded in primary and secondary care notes, the present study has attempted to confirm or refute diagnoses obtained from spirometry testing, but it should be recognized that individuals with asthma and COPD show considerable overlap in their responses to bronchodilators and corticosteroids.

The potential consequences of misdiagnosis include worry for the patient, provision of incorrect information, loss of trust if an incorrect diagnosis were later changed, inappropriate treatment and potential side-effects from that treatment as well as potential effects on the ability to obtain travel, employment and life insurance [12].

In the current study, a post-medication improvement in FEV1 of 500 mL was regarded as likely to suggest asthma, but it is recognized that some asthmatic individuals smoke heavily and will have emphysema and individuals with severe asthma and fixed air flow obstruction often do not “reverse”.

Routine spirometric testing in primary care settings is likely to result in considerable testing and treatment costs, resource utilization, and health care personnel time. It might reduce the number of individuals being labelled as having COPD or receiving disease-specific treatment in the absence of severe to very-severe airflow obstruction. However, it is likely to label a large number of individuals (many not reporting bothersome respiratory symptoms or having nondisabling symptoms) as diseased who would not benefit from testing or treatment [5].

CONCLUSION

Spirometry in addition to clinical examination improves COPD diagnostic accuracy compared to clinical examination alone. Spirometry is a useful diagnostic tool in individuals with symptoms suggestive of possible COPD.

Spirometry has also shown considerable impact on the assessment of severity of COPD that have been shown to have an important impact on clinical end-points. Reversibility testing, for diagnostic purposes, is recommended in anyone with modest degrees of airflow obstruction.

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