Original Article

Smoking cessation program as a tool for the early diagnosis of chronic obstructive pulmonary disease*

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Abstract

Objective: The impact of chronic obstructive pulmonary disease (COPD) is underestimated as a result of underdiagnosis and undertreatment. The objective of this study was to determine whether using spirometry to evaluate smokers enrolled in smoking cessation programs facilitates early diagnosis of COPD. **Methods:** The medical records of 158 smokers enrolled in the smoking cessation program at the Botucatu School of Medicine (Botucatu, Brazil) between January of 2003 and November of 2005 were evaluated retrospectively. All were over 40 years old (mean age: 55 ± 8.5 years), and 99 (62.6%) were female. We analyzed the clinical data, the previous medical diagnosis, and the spirometry results. **Results:** The diagnostic criteria for COPD were met by 57 (36.1%) of the 158 individuals evaluated, and 14 individuals (8.9%) were considered to be at risk for the development of the disease. Of those 57 individuals meeting the criteria for a diagnosis of COPD, 39 (68.4%) were receiving their first diagnosis of COPD, whereas 18 (31.6%) were receiving confirmation of a prior diagnosis. Of the 18 individuals previously diagnosed, 10 (56%) presented the mild/moderate form of the disease, and 8 (44%) presented the severe form. Of the 39 newly diagnosed individuals, 38 (97.4%) presented the mild/moderate for of the disease, and only 1 (2.6%) had severe COPD. Seven patients previously diagnosed with COPD presented pulmonary function test results inconsistent with the diagnostic criteria. **Conclusion:** Using spirometry in the initial evaluation of smokers enrolling in smoking cessation program might be a useful tool for early diagnosis of COPD.

Keywords: Smoking cessation; Spirometry; Pulmonary disease, chronic obstructive.

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Introduction

Chronic obstructive pulmonary disease (COPD) is defined as a preventable and treatable clinical entity characterized by chronic, not fully reversible, airflow obstruction.[1,2] Airflow obstruction is usually progressive and has been associated with abnormal pulmonary inflammatory response to inhalation of noxious particles or toxic gases, smoking being the principal etiologic factor.[2] Although it affects the lungs, COPD also has significant systemic effects.[1,2]

Nationally and internationally, COPD is recognized as a significant public health problem.[1,2] A recent study, carried out in the metropolitan area of the city of São Paulo, indicated that 15.8% of individuals aged 40 or older presented the disease.[3] The incidence is higher in males than in females and increases considerably with age.[1] In Brazil, according to data from the Unified Health Care System Department of Information and Information Science,[4] COPD ranks fifth among the leading causes of death, and the number of deaths caused by this condition has been increasing over the past 20 years in both genders.[1] In 2003, it was the fifth leading cause of hospitalization of individuals over 40 years of age treated in the public health sector.[1] The economic impact of COPD is relevant due to the high costs of prolonged hospitalization.[5]

The diagnosis of COPD is usually delayed since the disease progresses slowly and the patients can be asymptomatic or present onlydiscrete manifestations of the disease even when the expiratory flow values are considerably decreased.[1,6] Another cause of delayed diagnosis is the failure to recognize airflow obstruction on the part of untrained professionals.

Pronounced rates of undiagnosed airflow obstruction in patients who are not properly treated reinforce the need for measures that make the early and correct diagnosis of COPD possible.[7,8] Most patients with undiagnosed COPD present mild or moderate disease; however, the prevalence of symptoms is higher even in individuals with the mild form of the disease when compared with that of the patients without airflow obstruction. In addition, the effects of the disease on the overall health status and functional capacity of the patients increase according to the degree of airflow obstruction.[7] Within this context, spirometry and follow-up evaluation of patients exposed to risk factors of the disease, especially smokers, have proven to be efficacious measures.[6,7]

Therefore, the objective of this study was to determine whether using spirometry to evaluate smokers enrolled in smoking cessation programs facilitates early diagnosis of COPD.

Methods

We evaluated 158 smokers, aged ≥40 years, of both genders, who participated in the Paulista State University at Botucatu School of Medicine smoking cessation program between January of 2003 and November of 2005. In order to be included in the program, patients reported their smoking and clinical history, which included a specific survey on the presence of respiratory symptoms and previous diagnosis of COPD and other tobacco-related diseases.

All patients were submitted to anthropometric evaluation (measurement of weight and height) as well as to prebronchodilator and postbronchodilator spirometry. Forced expiratory volume in one second (FEV_1) and forced vital capacity (FVC) were measured using a computer-assisted system of pulmonary function (Med-Graph 1070; Medical Graphics Corporation, St. Paul, MN, USA), in accordance with American Thoracic Society criteria.[9] Values of FEV_1 were expressed in liters (L), as percentages of FVC, and as percentages of reference values.[10]

A diagnosis of COPD was given to smokers who presented $FEV_1/FVC < 70\%$ in postbronchodilator spirometry. The severity of the disease was classified in accordance with the criteria of the II Brazilian Consensus on Chronic Obstructive Pulmonary Disease.[1] Smokers with respiratory symptoms and $FEV_1/FVC \geq 70\%$ were considered at risk for developing this disease according to the classification proposed by the American Thoracic Society/European Respiratory Society.[2] Smokers diagnosed with asthma or presenting a >15% increase in postbronchodilator FEV_1 were excluded from the study.

This research project was approved by the Ethics in Research Committee of the Botucatu School of Medicine, and all patients gave written informed consent.

Results

The mean age of the smokers was 55 ± 8.5 years, and 62.7% were females. Table 1 shows the classifica-

Table 1 - Classification of smokers according to spirometry results and respiratory symptoms.

Classification	n	%
$FEV_1/FVC \geq 75\%$	74	46.8
$75\% > FEV_1/FVC \geq 70\%$ (asymptomatic)	13	8.2
$FEV_1/FVC \geq 70\%$ (symptomatic)	14	8.9
$FEV_1/FVC < 70\%$	57	36.1
Total	158	100.0

FEV_1: forced expiratory volume in one second; FVC: forced vital capacity.

tion of the smokers according to postbronchodilator spirometry results and the presence or absence of respiratory symptoms. Among the 158 participants in the program, 57 (36.1%) met the diagnostic criteria for COPD, and 14 (8.9%) were considered at risk for developing the disease. Of the 57 smokers diagnosed with COPD, only 18 (31.6%) had been previously diagnosed with the disease. However, in 7 (28%), a previous diagnosis of COPD was not confirmed by spirometry. There were 13 individuals (8.2%) who presented $75\% > FEV_1/FVC \geq 70\%$. However, none of these individuals reported respiratory symptoms.

Table 2 presents the general characteristics of the groups with and without COPD. Females predominated in both groups of smokers, those with COPD (59% female) and those without (64% female). The mean age was higher in the group of smokers with COPD. Body mass index (BMI), age at smoking onset, and tobacco intake were similar between the two groups. As expected, smokers with COPD presented lower FEV_1 and FEV_1/FVC values.

Figure 1 shows the percentage of patients diagnosed with COPD according to the severity of the disease. Of the 18 patients in whom a previous diagnosis of COPD had been confirmed by spirometry, 10 (56%) presented the mild or moderate form of the disease, and 8 (44%) presented the severe form. Of the 39 patients newly diagnosed with COPD, 38 (97.4%) presented the mild or moderate form of the disease, and only 1 (2.6%) presented the severe form.

Discussion

The objective of this study was to determine whether using spirometry to evaluate smokers enrolled in smoking cessation programs facilitates early diagnosis of COPD. The principal finding was that the initial evaluation with spirometry allowed a diagnosis of COPD to be made in 39 patients not previously diagnosed with the disease. Those 39 patients correspond to 25% of the smokers

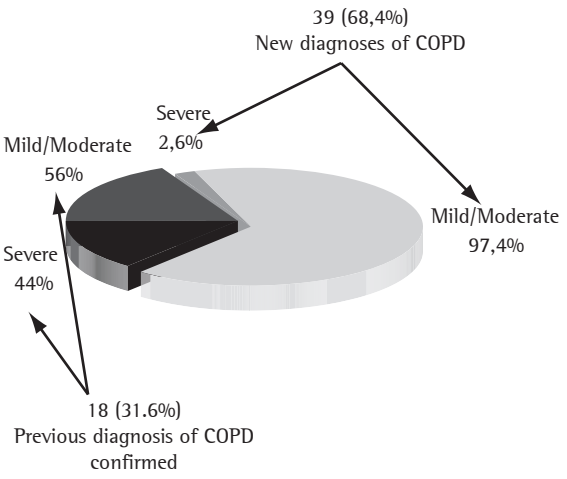

Figure 1 - Proportion of patients in the various stages of chronic obstructive pulmonary disease (COPD) among patients with and without a previous diagnosis of COPD.

Table 2 - General characteristics of the populations studied.

	COPD–[a] n = 101 (63.9%)	COPD+[b] n = 57 (36.1%)	p
Gender (F/M)	65/36	34/23	
Age, years	51.6 ± 7.4	59.6 ± 8.5	< 0.001
BMI, kg/m^2	26.4 ± 5.1	26.6 ± 5.5	NS
Tobacco intake, pack/years	31.5 ± 19.0	31.0 ± 26.0	NS
Age at onset, years	15.0 ± 12.0	13.0 ± 12.0	NS
FEV_1, %	101. 2 ± 15.9	73.2 ± 21.3	< 0.001
FEV_1/FVC, %	78 (75-82)	63 (57-67)	< 0.001

COPD: chronic obstructive pulmonary disease; BMI: body mass index; FEV_1: forced expiratory volume in one second; FVC: forced vital capacity; NS: not significant; [a]smokers without COPD; [b]smokers with COPD.

evaluated. In addition, the diagnosis of COPD was confirmed in 18 of the 25 patients who had previously been diagnosed with COPD. Therefore, 57 (36.1%) of the smokers met the diagnostic criteria for COPD, and 14 (8.9%) were at risk for developing this disease. Moreover, 13 (8.2%) of the smokers presented 75% > FEV_1/FVC ≥ 70% values; however, they did not present respiratory symptoms. In summary, we found that only 18 (31.6%) of the smokers diagnosed with COPD at the outset of the program had been previously diagnosed with the disease, whereas 84 (53%) had either presented lower pulmonary values, were at risk for developing this disease, or had been diagnosed with COPD. The criterion used in the previous diagnosis of COPD was the same as that of the *Proyecto Latinoamericano de Investigación en Obstrucción Pulmonar* (PLATINO, Latin American Project for the Investigation of Pulmonary Obstruction): postbronchodilator FEV_1/FVC ratio < 70%.[2,3] The PLATINO project showed unadjusted prevalence rates ranging from 7 to 19.7% in five metropolitan areas in Latin America.[11] In the metropolitan area of São Paulo, the total COPD prevalence was 15.8%. When only the smokers were evaluated, the unadjusted rate was 21.9%. The prevalence of COPD among the smokers evaluated in our study (36.1%) is more than twice as high as that found in other studies of individuals over 30 years of age in the data analysis of the Third National Health and Nutrition Examination Survey (NHANES III),[12] as well as being higher than that observed in smokers in the PLATINO study in the metropolitan area of São Paulo by 60%.[3]

The comparison of the prevalence of the different levels of severity of COPD found in the present study and in the PLATINO project (stage 0: 8.3 *vs.* 25.3%; stage I: 12.6 *vs.* 10.1%; stage II: 17 *vs.* 4.6%; and stage III: 5.6 *vs.* 0.9%) showed that a higher proportion of the smokers evaluated in the present study presented the more severe forms than does the general population over 40 years of age evaluated in the city of São Paulo.[11] Of the patients in whom the diagnosis was confirmed during the evaluation performed in the present study, 97.4% presented mild or moderate COPD, and 2.6% presented severe COPD. However, of the patients in whom the diagnosis had previously been confirmed, 56% presented mild or moderate COPD, and 44% presented severe COPD. In a spirometric study of the general population,[3] the milder forms of COPD were found to be more prevalent than were the more advanced forms of the disease. In our study, the same was found to be true when we compared the patients with and without a previous diagnosis of COPD at enrollment in the smoking cessation program.

Various studies have indicated that a great number of cases of airflow obstruction go undiagnosed.[7,8,13,14] Data from the NHANES III show that airway obstruction goes undiagnosed in 12% of the American population over 45 years of age, which is a higher value than that of the previous diagnoses of COPD (3.1%) and asthma (2.7%).[7] In the same population, it was found that 71.7% of those presenting mild obstruction and 46.2% of those presenting severe obstruction (FEV_1 < 50%) had not been diagnosed with airway obstruction.[5] The failure to diagnose COPD was also reported in a study of COPD prevalence carried out in Spain.[8] In that study, 78.2% of the cases detected had not been previously diagnosed. In addition, only 19.3% were currently being treated. One of the explanations for this fact is that the drop in respiratory function in patients with COPD is gradual over life, and, due to the adaptation of the patient to this slow increase of airflow obstruction or to the fact that physicians give little value to the symptoms and risk factors of the disease, the diagnosis is delayed.

However, in 28% of the smokers previously diagnosed with COPD, the results of the spirometry test did not confirm the diagnosis. Spirometry with volume-time expiratory curve is essential when there is clinical suspicion of COPD. This test should be performed before and after the administration of the bronchodilator, during the stable phase of the disease, since it is fundamental for the early and accurate diagnosis of airflow obstruction.[1,2] A diagnosis of COPD is defined by a postbronchodilator FEV_1/FVC ratio < 70%.[1,2] The postbronchodilator FEV_1, expressed as the percentage of predicted, provides an estimate of the severity of the airflow limitation and allows the staging of the disease.[1,2]

The underdiagnosis and consequent lack of treatment of COPD could play an important role in the increased morbidity and mortality resulting from the disease. Accurate diagnosis in the initial phases of the disease would allow intervention to reduce risk factors, particularly smoking, thereby avoiding further deterioration of pulmonary function. In addition, it would have a positive effect on the economic aspect of managing the disease.[5]

Late diagnosis, after patients have begun to present a pattern of severe airflow obstruction, presenting more accentuated respiratory symptoms and frequent exacerbations, results in greater health care expenditures and has considerable repercussions for the health status and functional capacity of patients with this disease.[7]

In conclusion, our results show that an evaluation that includes spirometric tests in smokers who enrol in smoking cessation programs can be a useful tool for increasing the number of individuals diagnosed with, or identified as being at risk for developing, COPD. Therefore, implementing effective measures for the treatment and control of the disease could reduce the impact of the advanced stage of the disease.

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