

THE DECREASE OF FEF₂₅₋₇₅ IS MORE SPECIFIC FOR ASTHMA THAN COPD

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Aim: Nowadays, there are still some difficulty to distinguish smoker asthmatic patients and COPD. Differentiation of these disorders is very important as their treatment choices are different. The aim of this study is to investigate the presence of auscultation together with pulmonary function test (PFT) findings and the power of these findings in distinguishing asthma and COPD patients.

Methods: 585 patients diagnosed of asthma and COPD according to international guidelines in our out-patient clinic were reviewed and their symptoms, risk factors, physical exam findings and PFTs were evaluated.

Results: The study consisted of 294 women and 291 men. The mean age of patients was 41.2±14.5 years. 433 patients were asthmatic and 152 had COPD. While there was a significantly concordance between auscultation and PFTs in non-smoker patients with asthma (p=0.00), we didn't find any accordance in smoker patients with asthma and COPD (p>0.05). If auscultation was normal and only FEF₂₅₋₇₅ parameter showing obstruction in PFT was lower this condition was found more specific for asthma (without cigarette influence) than COPD (p=0.000).

Conclusion: Our data shows that abnormal findings of auscultation and PFTs were more concordance in non-smoker patients with asthma. This indicates that PFTs (decrease in FEF₂₅₋₇₅) may be utilized noninvasively to distinguish asthma and COPD cases in outpatient clinics.

Key words: Asthma, COPD, FEF₂₅₋₇₅

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INTRODUCTION

Asthma and COPD are the most prevalent airway obstructive conditions and they are major health problems, but are still largely underdiagnosed and undertreated (1,2). Both are complex diseases in which inflammatory and remodeling processes have been depicted (3). Until recently, the presence or absence of reversibility was thought to be the major distinction between asthma and chronic obstructive pulmonary disease (COPD, with reversible airflow obstruction being the hallmark of asthma and mainly irreversible airflow obstruction the hallmark of COPD. Over the past few years, thinking about COPD has changed appreciably. Consequently, there are now new definitions for both asthma and COPD that acknowledge the overlap and highlight

the similarities and differences between them. The key to this change in thinking has been the recognition that chronic inflammation underlies both diseases (4). Both are chronic inflammatory diseases that involve the small airways and cause airflow limitation (5–10).

COPD and asthma have similar symptoms, including cough and wheezing. Differentiation of these disorders is very important as their treatment choices are different. A thorough history and physical examination is essential in identifying and distinguishing COPD from asthma. Several factors, such as a history of smoking, a family history of COPD, and unresponsiveness to appropriate asthma therapy, may be indicative of COPD. But, this distinction is very difficult to implement for the smoking patients. Spirometry is the

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Table 1. Demographic and clinical characteristics of the study groups. Data are expressed as mean±SD.

	ASTHMA (n:433)	COPD (n:152)	p
Age	36.81±15.0	53.57±12.4	0.000
Sex (F/M)	246/187	49/103	0.000
Smoker	127	98	0.000
Duration of smoking (year)	4.37±8.3	29.9±19.7	0.000
FVC	3.85±1.0	3.05±33.3	0.003
FEV1	2.99±0.9	2.31±0.9	0.000
FEV1/FVC	76.48±12.6	66.83±12.6	0.000
FEF2575	3.17±5.8	1.82±1.9	0.000
PEF	6.91±2.3	7.39±12.2	0.019
Positivity rate of reversibility	62.1%	39.5%	0.021

standard method for reaching an accurate diagnosis of asthma and COPD (1,2,11-13).

The aim of this study was to investigate the auscultation findings and pulmonary function test results in distinction for the asthma and COPD.

MATERIALS AND METHODS

Medical records of asthma and COPD patients admitted to out-patient clinic of the Acibadem Hospital Chest Diseases Department were collected prospectively between May 2004 and November 2005. A total of 585 patients were recruited in this time period.

The records include demographic data (age, sex and address) and medical information, including history, risk factors, objective findings and spirometric data. Risk factors included family history; allergy; tobacco smoking; occupational exposure to gas, fumes and inorganic/organic dusts; otorhinolaryngologic comorbidities (rhinitis, rhinorrhea, postnasal drip, polyposis, sinusitis); and gastroenterologic comorbidities (gastroesophageal reflux, hiatal hernia, pyrosis, dyspepsia, epigastric pain). The diagnosis was based on symptoms, physical examination findings, laboratory data including pulmonary function tests and skin prick test, and response to treatment according to GINA (1) and GOLD (2) guidelines.

The exclusion criteria were other pulmonary or uncontrolled systemic disease or incooperation. Duration of

disease was assessed by asking the patients when pulmonary complaints had started. Cigarette smoking habits were recorded as pack-years. The number of cigarette pack-years was calculated as the product of the period of tobacco use (in years) and the average number of cigarettes smoked per day.

A skin prick test was performed in duplicate with an ALK-Abello lancet with a 1-mm tip according to the EAACI recommendation (14). Patients were tested with 20 common inhalant allergens including *Dermatophagoides farinea*, *Dermatophagoides pteronyssinus*, *Alternaria*, *Aspergillus*, *Penicillium*, *Claudosporium*, Dog, Cat, Feather mix, Pollen III and IV mix, Secale, Weed mix, *Artemisia* and *Pariateria*, Trees mix, Olive, *Populus nigra*, *Quercus robur* and *Blatella germanica*. Histamine dihydrochloride (10 mg/ml) and glycerol diluent were used as positive and negative controls, respectively. A wheal size larger than 3 mm or greater than that produced by the control solution was considered a positive reaction.

Spirometric parameters were measured at rest using Vmax 229 Pulmonary Function Testing Instruments (Sensor Medics, Bilthoven, The Netherlands). These tests were performed in sitting position and the best of three values was recorded. The tests were compatible with ATS criteria (15). Bronchodilator response was assessed by comparison of pre- and postbronchodilator FEV1. The FEV1 increase greater than 200 ml and

%12 of the baseline value was accepted as positive bronchodilator response. Reversibility of airway limitation was measured after 200 µg salbutamol.

The methacholine bronchial challenge was performed by using a standardized computer-assisted dosimetric method as previously described (16). In brief, the methacholine was administered in doubling cumulative doses from 0.625 to 16 mg given at 5-min intervals until a 20% fall in the forced expiratory volume in 1 s (FEV1) was recorded. The provocative dose of methacholine producing a fall in FEV1 of 20% (PD20) was then calculated. A positive airway hyperresponsiveness was defined when the PC20 was < 8 mg/mL.

Statistical analyses were made using the statistical program SPSS 11.0. Data are expressed as means ± SD. Comparison of the data was analyzed by student-t test. The concordance between examination and PFTs were analyzed with χ^2 test. Statistical significance was accepted at $p < 0.05$.

RESULTS

The study consisted of 294 women and 291 men. The mean age of patients was 41.2 ± 14.5 years. 433 patients were asthmatic and 152 had COPD. Subjects' demographic and clinical characteristics are shown in Table 1. The two groups were significantly different regarding mean age, sex, duration of disease, smoking history and pack years and pulmonary functions including reversibility at baseline. Mean age of asthmatic patients was 36.81 ± 15.0 and it was 53.57 ± 12.4 in patients with COPD ($p = 0.000$). There was a male dominance in COPD group, whereas the number of females was higher in asthmatic group ($p = 0.000$). All patients with COPD were heavy smoker, but the majority of asthmatic patients did not have a smoking history ($p = 0.000$). There was a statistically significant difference between two groups when pack years were compared (29.9 ± 19.7 in COPD vs 4.37 ± 8.3 in asthma group, $p = 0.000$). In addition, the rate of skin test positivity in asthmatics was significantly higher than that of the COPD patients, 87% vs 6.5%, respectively. Bronchial reversibility ($\Delta FEV1\%$) in asthmatics was significantly higher than in COPD patients after administration of 400 µg salbutamol ($p = 0.021$). When

we investigated concordance between physical exam and PFTs, we didn't find any accordance between smoker patients with asthma and COPD ($p > 0.05$). There was a significantly concordance between auscultation and PFTs in non-smoker patients with asthma ($r = 30.97$, $p = 0.00$). If auscultation was normal and only FEF25-75 parameter showing obstruction in PFT was lower this condition was found more specific for asthma (without cigarette influence) than COPD ($r = 63.51$, $p = 0.00$).

DISCUSSION

Asthma and COPD are both defined by the presence of chronic airway obstruction. Because COPD and asthma have similar symptoms, including cough and wheezing, and COPD is the main condition considered in the differential diagnosis of asthma especially in smoking patients. Differentiation of these disorders is very important as their treatment choices are different. A thorough history and physical examination is essential for identification and discrimination COPD from asthma. Several factors, such as a history of smoking, a family history of COPD, and unresponsiveness to appropriate asthma therapy, may be indicative of COPD. But this distinguish is very difficult to the smoking patients. Spirometry is also a critical component of the work-up for all patients (11-13).

This study investigated the presence of clinical findings, including auscultation and pulmonary function tests findings and relationship between these observations to distinguish smoking asthma from COPD in routine clinical practice. We didn't find any accordance between patients with smoker asthma and COPD, whereas there was a significantly concordance between auscultation and PFTs in patients with nonsmoker asthma.

Physical examination of patients with asthma and COPD can be normal, especially in those with mild disease. But, diffusely diminished breath sounds are fairly consistent findings in advanced disease. Although a history and physical examination are necessary in the diagnostic work-up of patients with suspected COPD or asthma, demonstrating airflow obstruction is critical to confirmation of diagnosis (12). Sometimes whereas there has no auscultation finding, pulmonary function

tests may be abnormal or while we are hearing breath sounds (wheezing, stridor or ronchus), PFTs may be normal in patients with chronic obstructive disease in clinical practice. In the present study, we investigated to which obstructive disease may cause the discordance between auscultation finding and PFTs. We observed a discordance in both of smoker patients with asthma and COPD, but there were no discordance for non-smoker asthmatic patients. The results were considered that the smoking can cause discordance. Smoking does seem to increase the severity of asthma and morbidity.

Respiratory symptoms are increase among smokers (17-19). Cigarette smoke may affect airway function in different ways due to its toxic and proinflammatory effects(20). Nonasthmatic smokers frequently show signs of small-airways dysfunction, airway hyperresponsiveness, and a reduction of bronchodilator response (21-23). Smoking can also affect asthma and its response to treatment by influencing the underlying airway inflammatory process; increases in neutrophils have been described in this situation (24,25). These reports may help to explain the discordance between auscultation and PFTs in smoking patients of our study. Unfortunately there is insufficient evidence in this area. In addition, we made deep analyses and found a subgroup that had symptoms as cough and/or breathlessness, their physical exam's, FEV₁, FVC and FEV₁/FVC levels were normal, but FEF₂₅₋₇₅ was only decreased. The decrease of FEF₂₅₋₇₅ was not found to be significant merely in patients with COPD. As similar to examination, PFTs may be normal in mild disease (12). In this study, the majority of our patients with mild-to-moderate asthma and their cumulative years and degree of smoking were lower than COPD patients.

The influence of smoking on pulmonary function among asthma patients has not been studied as extensively as in nonsmokers, as smokers are generally excluded from studies. In a recent study, the ratio of FEV₁/FVC was found lower in smokers, suggesting increased airway obstruction. Smokers had also more evidence of small airways dysfunction as shown by changes in FEF₂₅₋₇₅% and lung hyperinflation (26). Both asthma

and COPD involve the small airways and the structural changes in the small airways are responsible for much of the physiological impairment that occurs in these diseases (27-29). It is suggested by experiments that small airways and the lung parenchyma play a role in asthma. Although the clinical significance of the small airways and the lung parenchyma in asthma is not yet know, it is possible that inflammation is poorly controlled in the distal airways (30). Accurate detection and early diagnosis of small airway dysfunction are important because, in mild to moderate asthmatics, treatment during early stages of the disease may be able to reverse airways remodeling and progression to airway fibrosis (irreversible airway damage) effectively. Also needed is an accurate way to assess distal airway inflammation noninvasively (31). This study suggests that presence of small airway obstruction in asthma can be measured noninvasively using spirometry in early stages. In additional, it has been considered that the small airway obstruction might be more specific for asthma in early stages than COPD.

In conclusion, our data shows that abnormal findings of auscultation and PFTs were more concordance in non-smoker patients with asthma. This indicates that PFTs (decrease in FEF₂₅₋₇₅) may be utilized noninvasively to distinguish asthma and COPD cases in outpatient clinics. This result should be investigated by further studies.

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