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Contribution of spirometry to early diagnosis of chronic obstructive pulmonary disease in primary health care centers

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Aim: Chronic obstructive pulmonary disease (COPD) is a common disease with increasing prevalence and mortality. We aimed to determine COPD prevalence in primary health care centers.

Materials and methods: Pulmonary function tests (PFTs) and face-to-face interviews were administered to 500 patients older than 40 years of age and attending a primary health care center with any symptoms. An early reversibility test was performed on patients with a forced expiratory volume in 1 s/forced vital capacity (FEV1/FVC) ratio below 70%. The survey results, PFTs, and early reversibility test results were evaluated according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria. All parameters were compared for groups with and without COPD.

Results: COPD was diagnosed in 25 (5%) of the patients. Of these patients, 60% were female and 40% were male. According to GOLD guidelines, 48% of the patients had mild COPD, 36% of them had moderate COPD, and 16% of them had severe COPD. According to their history and physical examination, 72 (14.4%) participants had been previously suspected of having COPD. PFTs revealed that 59 of them did not have COPD.

Conclusion: The utilization of spirometers in primary health care centers is important both for early diagnosis and to prevent misdiagnosis of COPD.

Key words: COPD, prevalence, spirometry, early diagnosis, primary care

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a major health problem all over the world (1). It is important to recognize and diagnose COPD early because appropriate management can prevent and decrease symptoms, reduce the frequency and severity of exacerbations, and improve health status. Today, however, only 25% of patients with COPD are diagnosed by health care centers (2). Spirometry is recommended for the diagnosis and management of COPD. Under-use or lack of spirometry devices makes it difficult to diagnose the disease at an early stage.

Most COPD patients have a smoking history of 20 pack-years before the onset of symptoms, and they present to a hospital at around 50 years of age because of respiratory symptoms. The main symptoms of COPD include dyspnea, cough, and sputum production. In addition, wheezy breathing can be observed. There is a weak relationship between the severity of symptoms and lung functions of COPD patients (3). They may be asymptomatic in the early stages of the disease. Early diagnosis of the disease, elimination of the etiologic factors, and effective symptomatic treatment are important for improving the quality of life in COPD patients (4,5).

In this study, we aimed to determine the prevalence of COPD and investigate the accuracy of COPD diagnosis due to history and physical examination findings alone, using a questionnaire and spirometry in patients above 40 years old, with any symptoms, that had been admitted to a primary health care center.

2. Materials and method

This study was conducted in a district of Erzurum, Dadaşkent, with 15,000 inhabitants. The research was carried out in the Dadaşkent Primary Health Care Center (DPHCC). The approximate population of those over 40 years old in Dadaşkent district is 5,000. The daily number of outpatients ranges from 200 to 250, and 30% of the patients admitted to the daily clinic are over 40 years

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old. The study population consisted of 500 people (196 males, 304 females) older than 40 years of age who were admitted to the DPHCC. The aim and plan of the study were explained to the participants by their physician. Patient confidentiality was maintained according to the guidelines established by the Local Ethics Committee of Atatürk University's Faculty of Medicine, which approved the study. Patients' informed consents were received. The height and weight of those who agreed to participate were measured. A 13-item questionnaire about demographic data, respiratory symptoms, smoking habits, previous respiratory diseases, and occupational exposure was answered by the participants.

In the study, a portable, rechargeable spirometer was used (MIR Medical International Research, Rome, Italy). Pulmonary function tests (PFTs) were performed. The best forced vital capacity (FVC), forced expiratory volume in 1 s (FEV1), and FEV1/FVC results were recorded. According to Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria, 400 μg of salbutamol was inhaled by individuals who had obstruction in the airways and the spirometric test was repeated after 20 min. Reversibility criteria were determined as an increase in FEV1 (≥12%) and an increase in absolute FEV1 (>200 mL) after the administration of a bronchodilator agent. All of these measurements were carried out by the physician conducting the study. The doctor's diagnosis was defined by history plus physical examination. All parameters were compared for the groups with and without a previous diagnosis of COPD.

The demographic data of the patients and the PFT results were evaluated using SPSS 11.0 for Windows (SPSS Inc., Chicago, IL, USA). The difference between groups was tested using the t-test. For the analysis of categorical variables the chi-square test was used. Statistical difference was considered significant if the P-value was less than 0.05.

3. Results

A total of 500 patients, 304 females (60.8%) and 196 males (39.2%) with an average age of 55 ± 11 years and mean body-mass index of 28.5 ± 5, were included the study. Of these patients, 198 (39.6%) had a smoking history and 116 (23.2%) had biomass exposure. The patients' risk factors are shown in the Table. Among COPD patients, 9 (36%) patients were nonsmokers, and 16 (64%) patients had a history of smoking. Among female patients with COPD (8 patients), biomass exposure was a more prominent risk factor than smoking.

Doctors had previously suspected 72 participants (14.4%) of having COPD. Of these, 59 were misdiagnosed. There were no patients with an obstructive disease that had reversibility according to the defined criteria. There were 48 patients using drugs against COPD. Figure 1 summarizes the prevalence of COPD as assessed by spirometric evaluation according to GOLD criteria. Of 25 patients with COPD (5%), COPD had been previously diagnosed in 13 patients (51.8%) and 11 were on medication. There were 12 newly diagnosed COPD patients, 8 females and 4 males. Prevalence was greater in women than in men (60% vs. 40%).

Table. Comparison of patients with and without COPD in terms of some risk factors.

Risk factors	FEV1/ FVC			
	<70	≥70	Total	
	Number (%)	Number (%)	Number (%)	P
Sex				
Female	15 (5)	289 (95)	304 (60.8)	0.9
Male	10 (5)	186 (95)	196 (39.2)	
Smoking habit				
No	9 (2.9)	293 (97)	302 (60.4)	0.01
Yes	16 (8)	182 (92)	198 (39.6)	
Biomass exposure				
No	17 (3.4)	367 (73.4)	384 (76.8)	0.8
Yes	8 (1.6)	108 (21.6)	116 (23.2)	
Occupational exposure				
No	24 (5.2)	436 (95)	460 (92)	0.4
Yes	1 (2.5)	39 (98)	40 (8)	

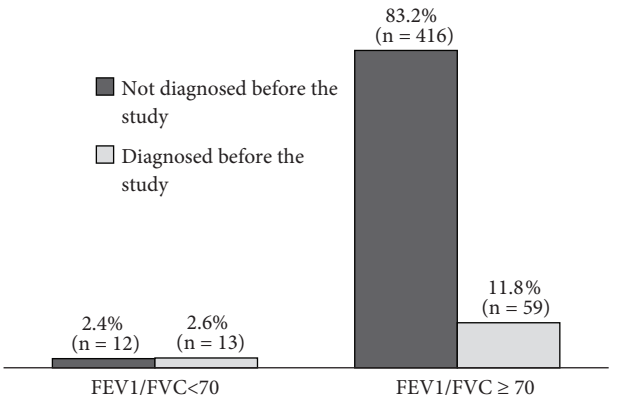

Figure 1. The evaluation of pulmonary function tests according to diagnosis of COPD before study.

Before the study, 4 patients were already diagnosed with severe COPD. Among newly diagnosed COPD patients, mild COPD was the type most frequently detected (Figure 2).

In the COPD group, only 1 patient (4%) had no respiratory complaints and 1 patient (4%) had only 1 symptom. Other patients had at least 2 symptoms.

4. Discussion

In our study, 25 patients (5%) were diagnosed with COPD using spirometric measurements. Among those 25 patients, 12 patients (48.6%) were newly diagnosed. Before the study, 72 patients (14.4%) had been diagnosed with COPD, but 59 of them were misdiagnosed. These findings suggest the importance of the use of spirometry, both for early diagnosis and to avoid misdiagnosis. COPD is among the highest-incidence diseases in the world. According to data from the World Health Organization, COPD is the fourth leading cause of death worldwide, and in 2020 it is

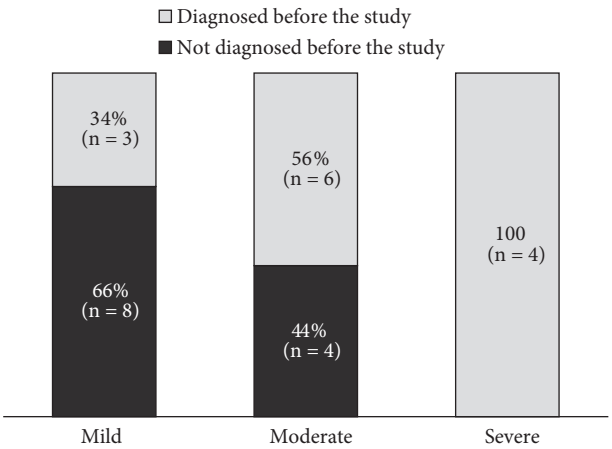

Figure 2. Classification of COPD patients with regard to severity of the disease.

expected to become the third most common cause of death. Unfortunately, sufficient epidemiologic data on COPD are lacking in Turkey, but COPD prevalence, morbidity, and mortality are all thought to be higher than was previously estimated. Although smoking is very common in Turkey, spirometric tests are not the basis for diagnosis of COPD as applied in primary health care centers. Thus, this results in serious deficiencies in the diagnosis and treatment of the disease.

Spirometry administered by trained individuals is required for early diagnosis and differential diagnosis of COPD. The availability of spirometers in primary health care is important. The calculation of prevalence of COPD depends on population studies and diagnostic methods. Expert opinion, a doctor's diagnosis, respiratory symptoms, and spirometric measurements to show the air flow limitation are important techniques for identification of the disease. Studies based on doctor diagnosis (6) have the lowest prevalence, whereas those based on the presence of respiratory symptoms (7) have the highest prevalence. However, the prevalence based on spirometry lies between the results of these 2 other approaches (8). The sensitivity and specificity of the estimate based on the parameters such as symptoms, patient history, and doctor's diagnosis are limited. Therefore, this study was planned to determine air flow limitation with the use of spirometry.

If the asymptomatic early stage of the disease becomes symptomatic, it reflects a severe loss of lung function and marks the progression of the disease. Proper training and use of spirometry reduces the misdiagnosis of COPD in the primary care center and allows early diagnosis. In our study, 72 participants (14.4%) had been previously suspected to have COPD by the doctor. However, only 13 of them had proof of airway obstruction upon spirometry. This shows that, without use of spirometry, COPD diagnosis is overestimated. On the other hand, studies in high risk groups have shown that use of spirometry increases the number of patients diagnosed with COPD (9–11). Thus, the widespread use of PFTs in the diagnosis of COPD as well as the postgraduate training programs that are proposed by the guidelines are important in order to reduce physician factors in the diagnosis of COPD (12).

COPD is often misdiagnosed (10). The first reason for this is that there are a significant number of physicians who are not interested in the risk factors and symptoms of COPD (6). Secondly, patients tend to adapt to the insidious onset of COPD symptoms, seeking medical advice only when the symptoms are aggravated or affecting their quality of life (8). In our study population, among those with COPD, only 1 (4%) did not have any symptoms, whereas all other patients had at least 1 respiratory symptom. Early attempts to quit smoking are required to encourage lung function in COPD patients. In our study, most patients newly diagnosed with COPD were smokers. Early diagnosis

increases the overall impact of the warnings about the hazards of smoking and may be a more effective alert than the more abstract target of "quitting smoking" (13,14).

Approximately 50% of COPD patients have significant symptoms (9–11). In our group, there was only 1 patient who had no symptoms, while the remaining patients had 1 or more respiratory symptoms.

A review performed by Halbert et al. (15) showed that in 16 of 32 studies, the prevalence of COPD was found to be significant. In different parts of the world, these 16 studies reported prevalences of COPD ranging from 4% to 10%. In the DPHCC, COPD prevalence in patients over 40 years was consistent with international COPD prevalence estimates given by Halbert et al. (15). Because our work was a cross-sectional study, we did not compare our results to the prevalence estimate. Moreover, we did not have any subject with stage 4 COPD, unlike other studies (16,17). These patients probably need therapy and should be followed in secondary and tertiary care units.

Multiple risk factors such as smoking, occupational exposure, air pollution, and biomass exposure can lead to the development of COPD. In our patients with and without COPD, only smoking was a risk factor, which has been shown to be the most important risk factor in the development of COPD (18). Smoking is responsible for 90% of COPD cases in developing countries (18). Smoking is prevalent in Turkey and is a major public health problem (19). In the Burden of Obstructive Lung Disease (BOLD) study conducted in the province of Adana (20) on patients with COPD, it was reported that only 12.3% of patients received treatment for COPD and that 48.1% were still smokers. In the present survey, among patients older than 40 years admitted to the DPHCC, 17.4% of women and 74% of men were smokers.

In conclusion, primary care physicians should have adequate training and should be equipped with spirometric instruments for the accurate and early diagnosis of COPD, as well as for effective treatment initiation.

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