ORIGINAL ARTICLE

# Prevalence characteristics of COPD in never smokers

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**Abstract** *Background:* Chronic obstructive pulmonary disease (COPD) is currently the 4th leading cause of death all over the world. Smoking is by far the most important documented (and preventable) cause for COPD. However, COPD can still be recorded among a good percentage of non smoker patients, due to other different causes.

*Methods:* This study was performed in the Chest Department, Menoufiya University, in the period from April 2009 to August 2011, on randomly selected 300 COPD patients, 230 patients (76.66%) were men and 70 patients (23.34%) were women. The mean age of the patients was $60.7 \pm 5.35$ years (range 42–83 years), and all patients were diagnosed as having COPD ($FEV_1/FVC < 70\%$), with the use of spirometry (prebronchodilator and postbronchodilator inhalation), according to the GOLD criteria. For each patient, the personal history (including his or her education level), smoking history, health status, and exposure to risk factors for COPD, were assessed according to a prewritten questionnaire.

*Results:* Out of the 300 COPD patients included in this study, 120 (40%) were never smokers and 180 (60%) were ever smokers. Women made up 41.7% of the never smokers (50 of 120) and 11% of the ever smokers (20 of 180). Never smokers were significantly older than smokers [$65.08 \pm 5.03$ years vs $56.33 \pm 5.67$ years ($P < 0.001$)] and were more likely to be women [41.7% vs 11% ($P < 0.001$)]. Never smokers made up to 40% (120/300) of all COPD cases: 78% (70/90) of all GOLD stage II cases, 45.5% (50/110) of all GOLD stage III cases. Among never smokers, 58.3% (70/120) fulfilled the criteria for GOLD stage II and 41.7% (50/120) fulfilled the criteria for GOLD stage III and no patients fulfilled the criteria of either GOLD stage I or GOLD stage IV. Never smokers were shown to have more occupational exposure to organic and inorganic dust and irritant gases at work place [41.7% (50/120) vs 27.7% (50/180), $P < 0.05$], more biomass exposure [41.7% (50/120) vs 0% (0/180), $P < 0.001$], less education [41.7% (50/120) vs 72.2% (130/180), $P < 0.001$], more exposure to passive smoking [75% (90/120) vs 22.2% (40/180), $P < 0.001$]. When compared with never smoker patients with moderate COPD (GOLD stage II), never smokers

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with severe COPD (GOLD stage III) were older in age (70.6 ± 2.44 years vs 61.14 ± 1.25 years, $P < 0.001$), have a higher female percentage (60% vs 28.6%, $P < 0.001$), lower BMI (21.2 ± 0.76 vs 26.14 ± 2.43, $P < 0.001$), more occupational exposure (27.5 ± 2.56 years vs 13.33 ± 2.39 years, $P < 0.001$), more biomass exposure (35 ± 4.15 years vs 20 ± 10 years, $P < 0.001$), less education (0% vs 71.4 educated, $P < 0.001$), more exposure to passive smoking (29 ± 2.02 years vs 13.75 ± 4.19 years, $P < 0.001$).

*Conclusions:* This study revealed that never smokers constitute a significant proportion of the Egyptian COPD patients. When dealing with COPD management, clinicians must be oriented with the different risk factors, other than tobacco smoke, that play a key role in the development and pathogenesis of COPD, because despite smoking is the most important risk factor, its absence doesn't exclude COPD diagnosis.

## Introduction

Chronic obstructive pulmonary disease (COPD) is an important and increasing cause of morbidity and mortality worldwide. It is the fourth leading cause of death and is projected to rank third among all causes of death by 2020 [1].

Smoking is by far the major cause of COPD worldwide, a fact that has been well known for at least 2 decades. COPD is considered rare in persons with no smoking history except in the context of another exposure, such as occupational dust, environmental air pollution, or biomass fuel. Accordingly, the disease has not been well characterized in persons who have never smoked [2–4].

However, in the past decade and especially the past 5 years, results from a growing number of published studies have suggested that risk factors other than smoking are strongly associated with COPD. These factors include exposure to indoor and outdoor air pollutants, workplace exposure to dust and fumes, history of repeated lower respiratory-tract infections during childhood, history of pulmonary tuberculosis, chronic bronchial asthma, intrauterine growth retardation, poor nourishment, and poor socioeconomic status [5]. It is now recognized that never smokers may account for between one-fourth and one-third of all COPD cases [6].

### Patients and methods

The study was conducted on randomly chosen 300 COPD patients aged from 42 to 83 years (60.7 ± 5.35) and (230 men and 70 women) during their admission in the Chest Department, Menoufiya University Hospitals or during their follow up visits to the outpatient clinic of the same, from April 2009 to August 2011. A written consent was obtained from each patient participating in this study.

All participants included in the study performed prebronchodilator and postbronchodilator spirometry and recorded a questionnaire data on personal history, smoking history, health status, and exposure to risk factors for COPD.

### Spirometry

Spirometry was performed according to American Thoracic Society (ATS) criteria [7]. Separate measurements were made before and at least 15 min after two puffs of Salbutamol (200 mg) administered with a metered dose inhaler with volumatic spacer. Irreversible airway obstruction was defined as a postbronchodilator FEV1/FVC < 0.7 according to the GOLD (Global Initiative for Obstructive Lung Disease) guidelines and the FEV1 was used to further stage the disease: FEV1 < 80% predicted served as the threshold for GOLD stage II COPD, FEV1 < 50% predicted served as the threshold for GOLD stage III COPD and FEV1 < 30% predicted served as the threshold for GOLD stage IV COPD [8].

### Questionnaire data

Questionnaire data were obtained from each patient and included information on smoking history and risk factors for COPD, education, comorbidities, respiratory diagnoses and childhood diseases.

An ever smoker (current or former) was defined as a person who had smoked > 20 packs of cigarettes in a lifetime or > 1 cigarette/d for a year. Exposure to passive cigarette smoke was defined as an answer to whether anyone (other than the participant) had smoked a cigarette, pipe, cigar or shisha in the participant's home or workplace. To assess occupational exposure, participants were asked whether they had worked > 3 months in occupations known or suspected to be associated with the risk of COPD and, if so, the number of years spent in each occupation. Occupational exposures were grouped into three categories: organic dust, inorganic dust and irritant gases, fumes, or vapors. Biomass exposure was recorded if the participant had experienced at least 6 months use of indoor fire for cooking or heating. Participants also reported the number of years of biomass exposure.

Additional measures evaluated included body mass index [BMI (kg/m$^2$)]; total number of years of education; self-reported hospitalizations for respiratory problems prior to the age of 10 years; and self-reported physician-diagnosed bronchial asthma, COPD, chronic bronchitis, emphysema or TB.

## Results

A total of 300 COPD patients had acceptable postbronchodilator spirometry data and completed the questionnaires. Of this group, 120 (40%) were never smokers and 180 (60%) were smokers. Women made up 41.7% of never smokers (50 of 120) and 11% of ever smokers (20 of 180).

Characteristics of the study population in smokers and never smokers are summarized in Table 1. Never smokers were significantly older than smokers [65.08 ± 5.03 years vs 56.33 ± 5.67 years ($P < 0.001$)] and were more likely to be