Arch Bronconeumol. 2013;49(6):223–229

ARCHIVOS DE BRONCONEUMOLOGIA

www.archbronconeumol.org

Original Article

Underdiagnosis of Chronic Obstructive Pulmonary Disease in Women: Quantification of the Problem, Determinants and Proposed Actions☆

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ARTICLE INFO

Article history:
Received 17 October 2012
Accepted 28 November 2012
Available online 3 May 2013

Keywords:
Chronic obstructive pulmonary disease
Spain
Spirometry
Underdiagnosis
Gender
Tobacco

ABSTRACT

Introduction: The distribution of chronic obstructive pulmonary disease (COPD) in women, and its underdiagnosis and determinants in the general population, have not been well described. The EPI-SCAN study is an epidemiologic, observational study conducted at 11 Spanish centers on the general population aged 40–80.

Patients and method: This paper describes the rates and extrapolates the population burden from the 3802 participants of the EPI-SCAN study.

Results: With 2005 female and 1797 male participants, there was a lower prevalence of COPD in women (5.7%; 95% CI, 4.7–6.7) than in men (15.1%; 95% CI, 13.5–16.8; *P*<.05). Among the 386 participants with COPD, 114 (29.5%) were women, who were younger, currently smoked less and had lower tobacco smoke exposure, while reporting a lower level of education (*P*<.05). As for the respiratory symptoms, there were no differences between sexes for cough, dyspnea or wheezing, but the women with COPD reported sputum less frequently (*P*<.05). There were no differences in the spirometric severity of COPD between women and men. Overall, 73% of the patients with spirometric COPD criteria were underdiagnosed, and this percentage is unevenly distributed by sex, being 1.27 times more frequent in women (86.0%) than in men (67.6%) (*P*<.05). By extrapolating the rates of prevalence and underdiagnosis of COPD to the general population, we estimate that there are 628 102 Spanish women between the ages of 40 and 80 with COPD, 540 168 of whom still have not been diagnosed.

Conclusions: There is a greater underdiagnosis of COPD in women than in men in Spain.

Infradiagnóstico de la enfermedad pulmonar obstructiva crónica en mujeres: cuantificación del problema, determinantes y propuestas de acción

Palabras clave:
Enfermedad pulmonar obstructiva crónica
España
Espirometría
Infradiagnóstico
Sexo
Tabaco

RESUMEN

Introducción: La distribución de la enfermedad pulmonar obstructiva crónica (EPOC) en mujeres y su infradiagnóstico y determinantes en la población no están bien descritos. El estudio EPI-SCAN es un estudio epidemiológico, observacional, realizado en 11 centros españoles en la población general de edades entre 40 y 80 años.

Pacientes y método: En este trabajo se describen las tasas y se extrapola la carga poblacional a partir de los 3.802 participantes del estudio EPI-SCAN.

☆ Please cite this article as: Ancochea J, et al. Infradiagnóstico de la enfermedad pulmonar obstructiva crónica en mujeres: cuantificación del problema, determinantes y propuestas de acción. Arch Bronconeumol. 2013;49:223–9.

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1579-2129/$ – see front matter

Resultados: Con 2.005 mujeres y 1.797 hombres participantes, se obtuvo una prevalencia de EPOC inferior en mujeres (5,7%; IC 95%, 4,7–6,7) que en hombres (15,1%; IC 95%, 13,5-16,8; p < 0,05). Entre los 386 participantes con EPOC, las 114 (29,5%) mujeres eran más jóvenes, menos fumadoras actualmente y tenían menor exposición tabáquica, y referían menos nivel de estudios (p < 0,05). Respecto a los síntomas respiratorios, no existían diferencias por sexo en tos, disnea o sibilantes, pero las mujeres con EPOC referían esputo menos frecuentemente (p < 0,05). No existían diferencias en la gravedad espirométrica de la EPOC entre mujeres y hombres. El 73% de los pacientes con criterios de EPOC fueron infradiagnosticados, y este porcentaje se distribuye desigualmente por sexo, siendo 1,27 veces más frecuente en mujeres (86,0%) que en hombres (67,6%) (p < 0,05). Extrapolando las tasas de prevalencia e infradiagnóstico de EPOC a la población, se estima que en España entre las mujeres con edades comprendidas entre 40 y 80 años existirían 628.102 mujeres con EPOC, de las cuales 540.168 aún estarían sin diagnosticar.
Conclusiones: La EPOC está más infradiagnosticada en mujeres que en hombres en España.

Introduction

The main risk factors for chronic obstructive pulmonary disease (COPD) are a history of tobacco smoking and aging.[1] Current projections indicate that in Spain, population aging (with a special effect in women due to their greater longevity) and the massive incorporation of women to smoking in the 1960–70s is already causing an epidemiological change, increasing smoking-related chronic diseases, particularly COPD,[2] which in women has been receiving growing interest in the literature.[3–8]

In 2007, the EPI-SCAN study found that the prevalence of COPD in Spain was 10.2% (15.1% in men and 5.6% in women) of the population aged 40–80 years.[9] Previously, the IBERPOC study, conducted in 1997, found a COPD prevalence of 9.1% (14.3% in men and 3.9% in women).[10] Both studies used different spirometric definitions and some modifications in the sampling methodology,[11] but the difference in the prevalence of COPD by gender remained, and significant geographical variability was demonstrated in the distribution of COPD.[12]

The determinants of underdiagnosis of COPD according to sex have received relatively a little attention to date, since most international initiatives on COPD such as the Latin American Project for the Investigation of Obstructive Lung Disease (PLATINO)[13] and the Burden of Obstructive Lung Disease (BOLD),[14] only describe the prevalence by sex, without even referring to underdiagnosis/undertreatment in women.

The aim of this study was to quantify the distribution of COPD, its underdiagnosis and determinants in women in Spain, and to provide a list of actions to reduce the expected imbalance in the management of COPD by sex, for both national and international use.

Methods

The methodology and protocol used in the EPI-SCAN study have been previously described in detail.[15] Briefly, EPI-SCAN is a Spanish national epidemiological, observational, multicenter population-based cross-sectional study with random participant selection using two-phase sampling, and stratified by areas close to the participating centers. These centers were selected according to four Spanish geographical areas (North, Mediterranean Coastal, South and Center), namely: Barcelona, Burgos, Córdoba, Huesca, Madrid (two centers), Oviedo, Seville, Valencia, Vic and Vigo. Study sampling was two-phase, population-based and random; it was carried out by telephone survey and included men and women from the general population aged between 40 and 80 years and resident in Spain. The field work was carried out between May 2006 and July 2007. The study was authorized by the relevant Ethics Committees, and all participants voluntarily agreed in writing to undergo the study tests.

Information on sociodemographic data, smoking habits, previous diagnosis of respiratory diseases and other pathologies, COPD exacerbations, dyspnea scale, and treatment for respiratory diseases was collected, among other variables. The presence of respiratory symptoms (habitual cough on rising, frequent sputum and occasional presence of dyspnea and wheezing) was collected using the Spanish version of the European Community for Coal and Steel (ECSC) questionnaire.[16] Forced spirometry was performed using the Master Scope CT (VIASYS Healthcare, Hoechberg, Germany). Acceptability and reproducibility criteria, and selection of the maneuver, proposed in the most recent *American Thoracic Society/European Respiratory Society* (ATS/ERS) recommendations[17] were employed; ECSC reference values were used.[18] The maneuvers were repeated 15–30 min after the inhalation of 200 mcg of salbutamol. Using the criteria in the ATS/ERS guidelines,[19] the bronchodilator test was considered positive when an increase in FEV_1 or FVC >200 ml and greater than 12% with respect to baseline was recorded. ECSC reference values were used to calculate the predicted spirometry values.[18] COPD was defined as a post-bronchodilator FEV_1/FVC ratio <0.70, and in a sub-analysis also as a post-bronchodilator FEV_1/FVC below the lower limit of normal (LLN).

Statistical Analysis

The EPI-SCAN study was conducted based on the following sample size calculation: a COPD prevalence of 12% was estimated, with precision ±1%. Assuming 20% losses, the theoretical number of individuals for inclusion in the study was 5071. Considering a posteriori that among the 11 areas in EPI-SCAN, the mean number of participants was 345 per area, with a maximum of 439 in Burgos and a minimum of 136 in Asturias, there was statistical power for most area comparisons with respect to the mean. As this was a descriptive population study, participation quotas by sex or other variables were not set. The estimator and its 95% confidence interval are presented in most of the analyses. The results for each variable are presented as mean and standard deviation in the case of continuous variables, and using the number of cases in each category and the relative frequency of the total number of responses in the case of categorical variables.

To quantify the number of COPD cases in the population, the rates obtained in EPI-SCAN were standardized according to the age and sex distribution of the Spanish population from official statistics.[20] Statistical significance was analyzed by performing an initial ANOVA and then a two-sided test for continuous variables and a Chi^2 test for categorical variables.

Finally multivariate analysis by logistic regression of the EPI-SCAN variable "being previously diagnosed with COPD" in the subsample of COPD individuals according to GOLD is presented, exploring, in addition to sex, the following factors by relative risk and 95% confidence interval (RR, 95% CI): age, smoking, education