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The relationship between chronic obstructive pulmonary disease and comorbidities: A cross-sectional study using data from KNHANES 2010–2012

Yong Suk Jo, Sun Mi Choi, Jinwoo Lee, Young Sik Park, Sang-Min Lee, Jae-Joon Yim, Chul-Gyu Yoo, Young Whan Kim, Sung Koo Han, Chang-Hoon Lee*

Department of Internal Medicine, Seoul National University College of Medicine, Division of Pulmonary and Critical Care Medicine, Seoul National University Hospital, Republic of Korea

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KEYWORDS
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Summary
Background: Multiple comorbidities related to chronic obstructive pulmonary disease (COPD) make it a difficult disease to treat. The relationship between these comorbidities and COPD has not been fully investigated. We aimed to determine whether COPD was independently associated with various comorbidities.
Methods: This was a cross-sectional study, which used data from the Korean National Health and Nutrition Examination Survey (KNHANES) V conducted between 2010 and 2012. Survey design analysis was employed to determine the association between COPD and 15 comorbidities. A COPD patient was defined as a smoker with forced expiratory volume in 1 s (FEV_1)/forced vital capacity (FVC) < 0.7 and comorbidities were defined based on objective laboratory findings and questionnaires.
Results: Of a total of 9488 patient who underwent spirometry, 744 (7.84%) COPD cases and 3313 non-COPD controls were included in the analyses. Although the prevalence rates of the majority of the comorbidities were high among the COPD patients, only hypertension (adjusted odds ratio [aOR], 1.63; 95% CI, 1.13–2.33 in Stage 1 COPD group; aOR, 1.92; 95% CI, 1.36–2.72 in Stage 2–4 COPD group) and a history of pulmonary tuberculosis (aOR, 3.38; 95% CI, 1.90

Abbreviations: aOR, adjusted odds ratio; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; FEV_1, forced expiratory volume in 1 s; FVC, forced vital capacity; KNHANES, Korean National Health and Nutrition Examination Survey.

* Corresponding author. Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine, Seoul National University College of Medicine, Seoul National University Hospital, 101 Daehak-Ro Jongno-Gu, Seoul 110-744, Republic of Korea. Tel.: +82 2 2072 4743; fax: +82 2 762 9662.
E-mail address: kauri670@empal.com (C.-H. Lee).

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−5.99 in Stage 2−4 COPD group) were independently associated with COPD after adjustment for age, smoking status, and confounders.
Conclusions: Only hypertension and a history of pulmonary tuberculosis were independently associated with COPD after adjustment for confounders among 15 comorbidities. The results suggest that majority of COPD patients might have similar risk factors with its comorbidities, including age and smoking status.

Introduction

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality worldwide, and its prevalence is increasing. At present, it is the fourth most common cause of death in the U.S., and it is expected to become the third most common cause by 2020 [1]. Without interventions to eliminate risk factors for COPD, especially tobacco smoke [1], deaths from COPD are projected to increase by more than 30% in the next 10 years [1]. COPD is not only a progressive debilitating disease but also a complex condition to manage because of its association with several comorbidities, which include cardiovascular disease, hypertension, diabetes, osteoporosis, anxiety and depression, sleep disorders, lung cancer, and anemia [2]. Previously, epidemiological data showed that over 50% of 1145 patients with COPD had one to two, 15.8% had three to four, and 6.8% had five or more comorbidities [3]. These comorbidities contribute to poor health, increased healthcare utilization, all-cause hospitalization, and mortality. It is well known that patients with COPD are more likely to die from comorbidities than from the actual disease [4].

Most patients with COPD have similar risk factors, such as age and smoking. To the best of our knowledge, the independent association of comorbidities with COPD has never been studied after adjustment for confounding risk factors. Furthermore, there appear to have been no comparisons of comorbidities in smokers without COPD (non-COPD smokers) and COPD. .In addition, the majority of studies of COPD have included only COPD patients who visit the hospital regularly and not the general population, potentially leading to selection bias in the evaluation of COPD comorbidities.

In this study, using data from the general population (the fifth Korea National Health and Nutrition Examination Survey [KNHANES V]), we investigated whether COPD is independently associated with various comorbidities by comparing comorbidities in COPD with not only normal controls but also non-COPD smokers.

Methods

Sampling strategy in KNHANES V

KNHANES is a nationally representative study designed to assess the health and nutritional status of civilians in Korea. KNHANES V was performed from 2010 to 2012. It is based on data from the Korean Statistical Office census and 3800 households from 576 randomly selected survey areas, which are drawn from a census of the population annually, with the number selected proportional to the size of each area. Trained interviewers administer questionnaires on various health-related information, and subjects self-report their alcohol and smoking habits. KNHANES uses a complex, multi-stage probability sample design. The present study sample represents the total non-institutionalized civilian population of Korea [5,6]. The present study used the KNHANES database and was given an exemption from informed consent by the Institutional Review Board Committee of our hospital because we used public data provided by KNHANES(IRB No. 1401-047-547).

Definition of COPD

A previous study reported a low prevalence rate of COPD among females in Korea [7]. Given the expected low rate of the disease among females, the final analyses included only male participants. COPD was defined as a former or current smoker with spirometry-proven airflow limitation (forced expiratory volume in 1 s [FEV_1]/forced vital capacity [FVC] <0.70). As spirometry is performed only in subjects over 40 years, the cohort consisted of patients older than 40. We supplemented smoking history to the definition of COPD to reduce the possibility of including cases with asthma because there were no post-bronchodilator spirometry results. The severity of airflow limitation was classified according to the Global Initiative for Chronic Obstructive Lung

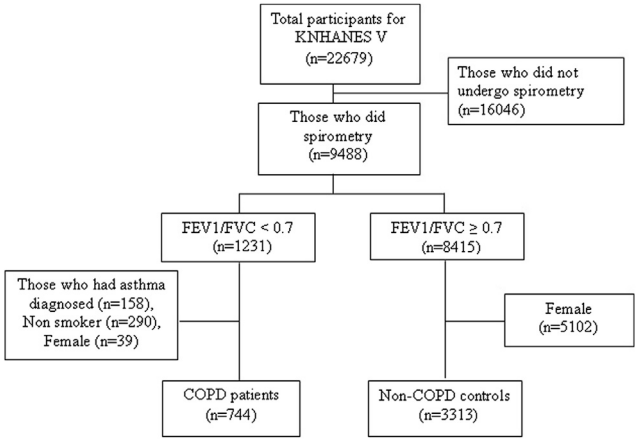

Figure 1 Flow diagram of patients through the study. FEV_1, forced expiratory volume in 1 s; FVC, forced vital capacity.