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Prevalence and management of COPD and heart failure comorbidity in the general practitioner setting

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ABSTRACT

Background: COPD frequently coexists with HF with which shares several risk factors. A greater collaboration is required between cardiologists and pulmonologists to better identify and manage concurrent HF and COPD. This observational, retrospective study provides new data regarding the management of these patients.

Methods: from the Health Search Database which collects information generated by the routine activity of general practitioners, we selected 803 patients suffering from COPD or HF alone or combined analyzing similarities and differences regarding risk factors, diagnostic workup and therapeutic approaches.

Main results: Statistical analyses have evidenced significant differences regarding exposure to cigarette smoke and the prevalence of diabetes and hypertension in the three groups of patients. As regard to the diagnostic workup, it has been found that the 63,9% of COPD patients and the 57,1% of COPD + HF patients performed a spirometry vs the 95,4% of HF patients and the 95,2% of COPD + HF patients that performed an ECG.

Regarding the pharmacologic treatment, the 47% of COPD patients was treated with an ICS/LABA association and the 22% with ICS/LABA + LAMA. In the COPD + HF group, 47% of patients were treated with ICS/LABA association, while 32% of these patients were treated with ICS/LABA + LAMA. The pharmacologic treatment most prescribed in HF was β-blockers (68%), diuretics (92.8%), antiplatelet therapy (55.6%) and ACE inhibitors (38.1%). In the COPD + HF group, β-blockers (40.1%), diuretics (89.8%), antiplatelet therapy (57.1%) and ACE inhibitors (44.9%) were prescribed.

Conclusion: this study has evidenced a disparity in performing instrumental diagnosis between COPD and HF groups that persists when both conditions coexist. Moreover, the pharmacological treatment of the two conditions shows a consistent under treatment with bronchodilators in COPD patients and with β-blockers in HF patients.

1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive condition characterized by persistent airflow limitation not fully reversible associated with an enhanced chronic inflammatory response of the airways and the lungs to noxious particles or gases [1].

Epidemiological evidences show that is currently the third

Abbreviations: COPD, chronic obstructive pulmonary disease; GOLD, global initiative for chronic obstructive lung disease; HF, heart failure; HSD, health search database; ICD, international classification of diseases; echoCG, echocardiogram; BMI, body mass index; ECG, electrocardiogram; ICS, inhaled corticosteroid; LABA, long acting β2-adrenoceptor agonist; LAMA, long acting muscarinic antagonist; ACE, angiotensin-converting-enzyme.

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leading cause of death in the world [2]. The diagnosis of COPD requires spirometry to confirm the presence of airflow limitation not fully reversible. Spirometry should be obtained in all persons with the following history: exposure to cigarettes and/or environmental or occupational pollutants; presence of cough, sputum production or dyspnoea [3]. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) has divided the airflow limitation as determined by spirometry into four grades according to the impairment in FEV1 (mild: FEV1 $\geq$ 80% predicted; moderate: 50% $\leq$ FEV1<80% predicted; severe: 30% $\leq$ FEV1< 50% predicted; very severe: FEV1< 30% predicted) and using the fixed ratio, post-bronchodilator FEV1/FVC < 0.7, to define airflow limitation [4].

It is estimated that the worldwide prevalence of COPD is 11.4% in people aged $\geq$30 years [5]. COPD is commonly associated with comorbidities that imply further negative impact on quality of life and prognosis [6]. In particular, COPD coexists frequently with Heart Failure (HF) with which shares several risk factors such as cigarette smoking, advanced age and systemic inflammation [7]. HF is a complex clinical syndrome with typical symptoms such as shortness of breath at rest or during exertion, and/or fatigue, signs of fluid retention such as pulmonary congestion or ankle swelling, and objective evidence of an abnormality of the structure or function of the heart at rest. Various descriptive terms of HF are used, for example, systolic and diastolic HF or HF with reduced and normal left ventricular ejection fraction [8–10]. It has been described that the prevalence of HF ranges from 2.2% to 3.9% in a general population and increases with increasing age [11,12].

Several studies provide evidences that COPD and HF often coexist and this happens more frequently than expected from their separate population prevalences [7,13,14]. The prevalence of COPD is estimated to range from 23 to 33% in patients with chronic heart failure [15]. On the other hand, a meta-analysis review has described that the prevalence of HF ranges from 5% to 41% in patients with COPD [16]. Moreover, it has been reported that the risk of developing HF among COPD patients is higher than that of individuals without the disease and that patients with COPD reported cardiovascular risk factors such as hypertension, diabetes and smoking more often compared to non COPD population [16].

Although coexistence of the two diseases is common, often only one of the two is diagnosed resulting in under-treatment. However, estimates of combined prevalence must be interpreted cautiously because of difficulties and imperfections in assessment of both diseases, considering also that the prevalence is influenced by the population under study and by the diagnostic criteria used [13,17].

Future studies should be directed at determining more precise estimates of coexistence of COPD and HF and at providing new data on the management of patients, with the purpose to improve their survival and quality of life. In this regard a greater collaboration is required between cardiologists and pulmonologists to better identify and manage concurrent HF and COPD. In this observational, retrospective study we collected information about patients suffering from either COPD or HF alone or combined analyzing similarities and differences regarding risk factors, diagnostic workup and therapeutic approaches.

2. Methods

2.1. Data collection

We conducted an observational, population-based retrospective study using information obtained from 50530 files of 38 Sardinian general practitioners homogeneously distributed throughout the region. The data were obtained from the Health Search Database (HSD) which collects information generated by the routine activity of general practitioners who use a dedicated software (Millewin ©) for recording and managing clinical data. From this database the data were extracted by using International Classification of Diseases (ICD) codes that identify illnesses, diagnostic and therapeutic procedures. For this study the ICD codes referred to COPD and HF, J44 group and I50 group, respectively [18]. Some comorbidities, such as hypertension and diabetes have been evaluated. Conversely, other cardiovascular diseases, such as ischemic heart disease or arrhythmias, were not considered for this study.

2.2. Patients selection

The selection of the patients was based on the presence of a diagnosis of COPD and/or HF in the general practitioners clinical records, identified by the ICD codes group J44 for COPD, and group I50 for HF. Moreover, we selected those patients that had an instrumental diagnosis, that means a spirometry for COPD or an echocardiogram (echoCG) for HF, while for those patients without instrumental diagnosis, we considered eligible for the study the patients receiving a chronic specific treatment for COPD and/or HF. The study sample included 803 patients with COPD or HF alone or combined. We have analyzed clinical parameters, risk factors for both diseases, diagnostic workup and pharmacological treatment of the patients involved. All the data were collected anonymously in accordance with the current privacy laws. Since the study was a retrospective analysis of data already available in the HSD, and confidentiality of patients was in no way violated, local rules do not request approval by an ethics committee.

2.3. Statistical analysis

Quantitative variables are expressed as mean values (mean ± SD) and median values (median and range) while categorical variables are expressed as percentages. Variables distribution was assessed by the Kolmogorov-Simirnov test. Statistical differences between groups of patients were performed using ANOVA Student-Newman-Keuls or Krustall-Wallis as appropriate and Chi-square test for categorical variables.

3. Results

504 (62.8%) patients had COPD, 152 (18.9%) had HF and 147 (18.3%) had both diagnoses. The prevalence of COPD was 1.3%, while the prevalence of HF was 0.6% in the examined population, aged between 31 and 102 years. The prevalence of HF in COPD patients turned out to be 22.5%. Table 1 describes the main demographic characteristics of the patients and summarizes various risk factors and comorbidities common to both diseases. The analyses have shown that the percentage of males in HF group was lower compared to COPD and COPD + HF groups (41.4% vs 58.9 and vs 61.9 respectively, $P < 0.001$). Also age was lower in patients suffering from COPD compared to patients suffering from HF and COPD + HF (median 74.0 vs 79.0 and vs 80.5 respectively, $P < 0.05$). The exposure to cigarette smoke (current smokers and ex smokers) was observed in the 68% of COPD patients, in the 35% of HF patients and in the 63% of patients suffering from both diseases. The analyses by means of Chi-Square test showed significant differences of these frequencies between groups (HF vs COPD, $P < 0.0001$; COPD + HF vs HF, $p < 0.0001$). Important comorbidities were represented by diabetes (COPD: 18%, HF: 39%, COPD + HF: 38%) and hypertension (COPD: 66%, HF: 83%, COPD + HF: 84%). Significant differences were found analyzing comorbidities between HF group and COPD + HF group vs COPD ($P < 0.0001$) for diabetes as well as for hypertension (HF vs COPD, $P < 0.001$; COPD + HF vs COPD, $P < 0.0001$) (Table 1). The analyses by means of ANOVA showed that body mass index (BMI) was significant higher in HF group and in COPD + HF group