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Original article

# DOES CHRONIC OBSTRUCTIVE PULMONARY DISEASE AFFECT THE CLINICAL COURSE OF HEART FAILURE?

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**ABSTRACT:**

Heart failure (HF) is the final syndrome in the evolution of many heart diseases. Chronic obstructive pulmonary disease (COPD) syndrome is an important part of the clinical evolution of many parenchymal and vascular lung diseases. It is known that the downward curve of HF evolution and survival is being broken by many cardiac and non-cardiac comorbidities. Very often, there are patients who suffer from both heart and lung disease.

The aim of our study was to find out whether COPD has an impact on morbidity, mortality rate and life quality of patients with diagnosed heart failure.

The study comprised 256 patients admitted into our cardiology clinic in the period February 2014 –23rd of December, 2015. The patients were included depending on whether they comply or don't with certain criteria. They are divided into groups: HF with COPD and HF without COPD, as well as into functional classes (FC).

Quite often, COPD coexists with HF, and they do share several risk factors. Patients with HF belonging to 2nd and 3rd FC and patients with COPD have relatively lower survival level and higher mortality level than patients only with HF in the same FC. Greater collaboration between cardiologists and pulmonologists is necessary in order to identify and manage HF and COPD at the same time.

**Keywords:** HF, COPD, survival rate, mortality rate, sex,

**INTRODUCTION:**

Heart failure (HF) is a syndrome that has a bad prognosis, despite the optimization of treatment for cardiovascular disease (CVD). Comorbid diseases associated with CVD are common and frequently affect the clinical evolution of HF. These diseases change over time and depend on the severity of the underlying process. A major problem in HF management is to what extent the severity of non-CVD comorbidity affects the individual risk [1].

Few non-CVD comorbidities have been studied for the severity of impact and outcomes in HF. In a study conducted among 348 patients with HF, the COPD severity as measured by spirometry was strongly associated with mortality rate with an increased risk in the lower to higher severity groups [2]. This finding is consistent with another study of 184 patients with coexisting COPD, where the COPD severity in stage 3 compared to stage 1 was associated with a 220% increased risk of mortality [3].

Statistical analyses showed significant differences in cigarette smoke exposure and the prevalence of diabetes and hypertension in the three patient groups. As for the diagnostic processing, it was found that 63.9% of COPD patients and 57.1% of COPD and HF patients had spirometry compared to 95.4% of patients with HF and 95.2% of COPD and HF patients who had an ECG.

A registered, prospective cohort study was conducted in Blekinge county in Sweden, with about 150,000 inhabitants. The participants in the study were people ≥35 years of Age. Data on diagnoses of COPD and heart failure(HF) come from the 2007 Health Register, which identified 984 people as diagnosed with COPD [4].

Other authors (Elzbieta Kaszuba, Håkan Odeberg, Lennart Råstam et al) have shown that pre-existing HF significantly increases the risk of death in COPD patients [5]. Mortality in patients with COPD and concomitant HF is strongly associated with Age, male gender and other comorbidities. Of these three indicators, only other comorbidities can be affected. It is important to identify other comorbidities early and to treat them adequately in patients with COPD and concomitant HF, as they significantly affect survival.

**The aim** of our study was to find out whether COPD affects morbidity, mortality rate in patients with confirmed HF.

## CLINICAL CONTINGENT AND METHODS:

The inclusion of patients in the study was approved by the local ethics commission at the University Hospital "Dr Georgi Stranski" EAD - Pleven. A selection of 256 patients was done. The patients were subsequently admitted to the "Cardiology" Clinic in the period February 2014 –23rd of December, 2015. The follow-up was prospective. The inclusion of patients was based on the following criteria:

1. Including criteria:

1.1. Age above 18 years

1.2. Oral consent for questioning and follow-up of patients

1.3. Confirmed HF from II-nd to IV-th FC", according to New York Heart Association (NYHA) classification.

2. Excluding criteria:

2.1. Age under 18 years

2.2. Refusal of the patient to participate

2.3. Patients with malignancies

2.4. Patients with diseases of the musculoskeletal system not permitting the 6-minute walk test.

3. Object of the study:

We conducted a prospective study of patients hospitalized in the First "Cardiology" Clinic, University Hospital "Dr Georgi Stranski"- Pleven city. Analyzing the data, obtained from the used information sources on HF and concomitant comorbidities, we identified and proposed for monitoring and research the following indicators:

3.1 Demographic and social indicators: gender, Age, place of residence, ethnicity, social status, harmful habits - alcohol use, smoking.

3.2 Clinical history and status data for HF and its NYHA class, chronic renal failure, COPD, type 2 diabetes, gout, anemia, changes in thyroid function, depression, obesity and sarcopenia

3.3 Data from instrumental diagnostics

3.4 Laboratory indicators: CRP, NTproBNP, WBC, HBG, Ser.Fe, TIBC, TPROT, CREAT, UREA, GLU, TBIL, DBIL, ASAT, ALAT, K, Na, TrHS, TSH, EGFR, MDRD

3.5 Statistical methods

Analytical methods of classical and modern statistics are applied. The statistical processing of the information is realized with the help of the computer packages: Microsoft Excel 2010, SPSS v.23.0 and Statgraphics XV for Windows.

The statistical reliability of the results in the studied groups and the proof of hypotheses, developed by us in the course of this study were tested by different methods in all studied groups. The above indicators are included in the prepared questionnaires for every patient. The results of the study are analyzed, systematized and presented in tables, graphs and charts.

4 Location of the study:

The patients included in the study were interviewed and examined at the First "Cardiology" Clinic at the University Hospital "Dr G. Stranski" EAD – Pleven.

5. Methodology:

The following methods have been applied in the development of this dissertation:

5.1. Documentary and sociological method

5.2. Clinical methods

5.3. Instrumental methods

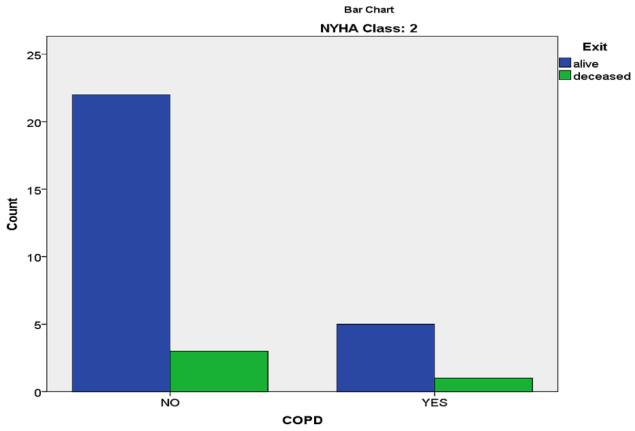
## RESULTS AND DISCUSSION:

In our group of COPD patients, we used data from medical history and patient documentation. We assume that patients do not have an exacerbation of COPD due to the fact that patients are hospitalized because of decompensation of HF with fatigue and shortness of breath of cardiogenic nature (specified by BNP study).

The analysis of a whole group demonstrated that 27% have a medical history of COPD, for which they are being monitored systematically by a pulmonologist and receive the necessary therapy.

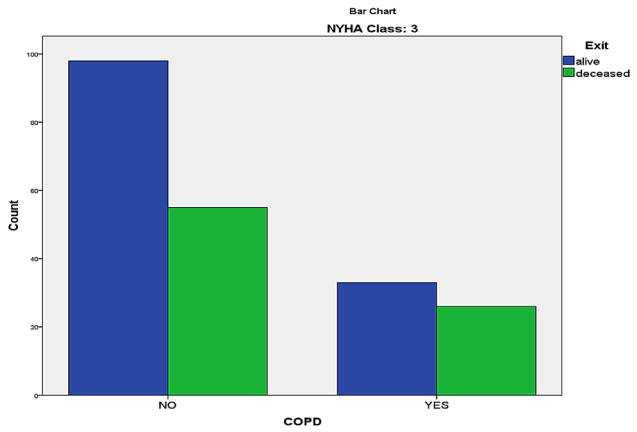
We analyzed the number of patients who died both in the group with COPD and HF, and those with HF without COPD (Fig. 1). The analysis is for each functional class in the study group.

**Fig. 1.** Distribution of death number of patients with and without COPD in NYHA Class 2 HF (p = 0.598)



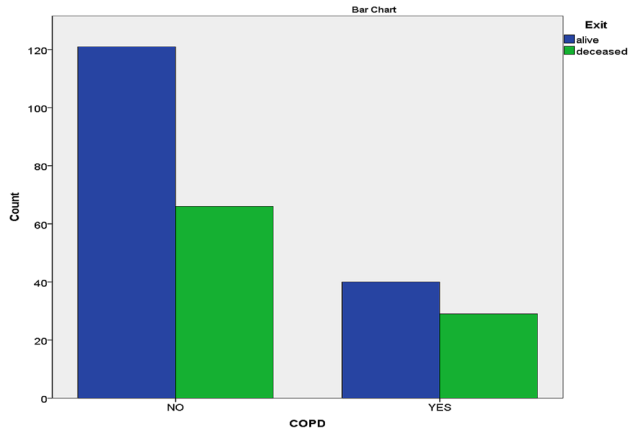

We found that in 2nd FC, 16.7% of COPD patients died and 12% of those without COPD; this shows a tendency towards higher mortality rate in patients with combined HF 2nd FC and COPD. (Fig. 2.)

**Fig. 2.** Distribution of the number of patients who died divided into patients with and without COPD in NYHA Class 3 HF (p = 0.175)




The analysis of the group with COPD in 3rd FC HF again demonstrates a tendency for higher mortality rate in COPD patients compared to those without COPD. The death rate in COPD patients and HF 3rd FC was 44.1% versus 38.2% for those without concomitant COPD (Fig. 3.) We analyzed the whole group without dividing patients with NYHA FC.

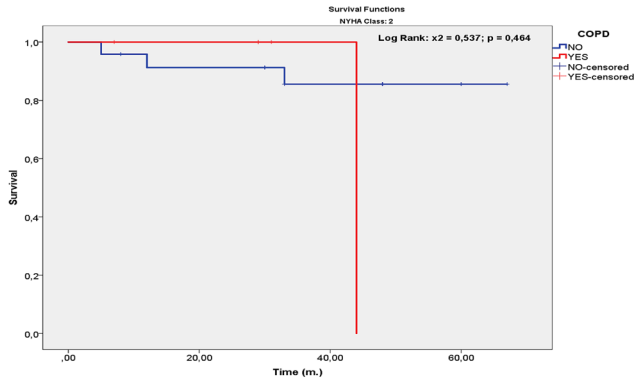
**Fig. 3.** Total distribution of the number of deceased patients divided into HF patients with and without COPD (p = 0.199).




We found that both in the subgroups and in the general one there was a tendency for the higher mortality rate in patients with HF and COPD (42%) compared to those without this comorbidity (35%). These data support the thesis that COPD increases the mortality rate in patients with HF. Probably some studies already demonstrated the fact that patients with COPD are associated with a 50% higher risk of coronary cases and contribute to the worsening of pre-existing ischemic heart disease.

We analyzed the survival rate of patients with COPD both in the general group and in the different classes of HF. We found that patients with COPD and HF 2nd FC have a lower survival rate of around 20 months compared to those without COPD. (Fig. 4)

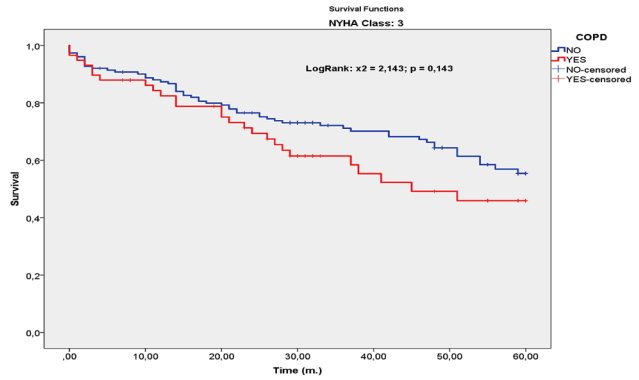
**Fig. 4.** Survival rate for patients with HF 2nd FC with and without COPD




The survival rate in patients with third FC and COPD is significantly lower (Fig. 5). These data are uni-directional with the comorbidities data in COPD presented in the dissertation of Pavlov.

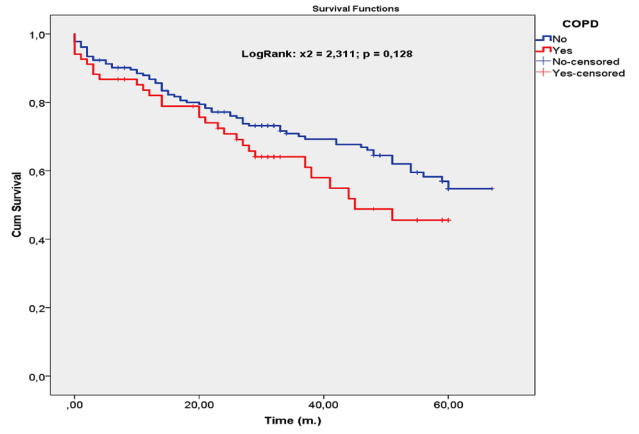
We found a strong trend for higher mortality rate in patients with concomitant COPD and HF 3rd FC (Fig. 5).

**Fig. 5.** Survival rate of patients with and without COPD in 3rd FC NYHA HF.



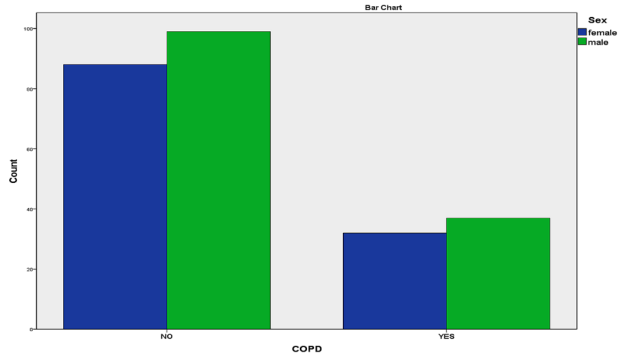

We analyzed the survival rate of COPD patients and HF without dividing it into subgroups according to the functional class of HF. (Fig. 6).

**Fig. 6.** Survival rate of patients with and without COPD in the general group of HFpatients.



Also in the subgroups, the presence of COPD reduced the survival rate in patients with HF. We also analyzed the prevalence of COPD in patients with HF according to their gender (Fig. 7).

**Fig. 7.** Prevalence of COPD among patients with HF by sex (p = 0.518)




In our study, COPD was higher among men in patients with chronic congestive heart failure, with no statistically significant differences. This coincides with the findings by other researchers that the mortality rate in patients with COPD and concomitant HF correlates strongly with Age, male gender and other comorbidities [6, 7].

The analyses revealed trends of higher mortality rate in patients with concomitant COPD. These data support the results of published studies showing higher mortality and lower survival rates in patients with HF and concomitant COPD [8].

According to Pietro Pirina, Marco Martinetti, Claudia Spada et al., COPD and CH are very important in the general population [9]. Their coexistence leads to an impaired prognosis and a high mortality rate. General practitioners manage COPD and HF differently during diagnosis. The therapy is characterized by the treatment of COPD patients with bronchodilators, while the treatment of COPD and HF patients consists of bronchodilators and β-blockers [10].

**CONCLUSION:**

COPD often coexists with HF, and they share several risk factors. Patients with HF in 2nd and 3rd FC and COPD have relatively lower survival rate and higher mortality rate compared to the patients with HF in the same FC alone. Greater collaboration between cardiologists and pulmonologists is necessary in order to identify and manage HF and COPD at the same time. Our observational and prospective study provides new data on this issue.

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