ramr
American Review of Respiratory Medicine
Revista Americana de Medicina Respiratoria

ORIGINAL ARTICLE

ISSN 1852-236X

Comorbidities in COPD and their impact on morbidity and mortality after a 5-year follow-up

Comorbilidades de la EPOC y su impacto en la morbimortalidad en 5 años de seguimiento

Abrate, Vanesa del Valle; Ubal, Leonardo Germán; Fernández, Jésica Noelia; Elías, Marcos Alfonso; Olmos, María Eugenia; Cesaratto, Favio; Carrizo, María Fernanda; Stechina, Juan; Usedo, Nicolás; López de Navarro, Ana María*

Received: 11/04/2022
Accepted: 05/02/2023

Correspondence
Abrate Vanesa del Valle
Mail: abrate.vanesa@gmail.com

ABSTRACT

Objectives: To evaluate the evolution of comorbidities in a cohort of patients with COPD after 5 years of follow-up. To evaluate mortality. To assess and correlate COPD severity, COPD-specific comorbidity test (COTE) Index, and mortality.
Materials and Methods: Prospective observational study in a cohort of patients with COPD during 2015-2020 at the Pulmonology Service of the Hospital Privado Universitario de Córdoba. Information of electronic medical records. In order to predict the mortality risks, we used the COTE Index. Statistical analysis: Fisher's exact test, Student's t test and InfoStat.
Results: 68 patients, 37 male (54.41%), age 75 ± 6.69. 2 patients lost to follow-up. The time since COPD diagnosis was 13.23 ± 5.88 years at the study entry. More than 50% of patients had moderate COPD. There were no differences in post-bronchodilator FEV1(forced expiratory volume in one second) (0.57 in 2015 vs. 0.58 in 2020), nor in the frequency of exacerbations in the last year (1.06 ± 1.26 vs. 0.85 ± 1.44). In 2015, 29.41% of patients (n20) were active smokers, and the number was reduced to 18.18% (n12). In 2015, 73.53% of patients (n50) were receiving ICS (inhaled corticosteroids), and in 2020 the number decreased to 56.92% (n37) (p0.047). In 2015, 4.41% of patients (n3) were receiving systemic steroids, and the number increased to 20% (n13) in 2020 (p 0.007). There weren't any significant differences in the frequency of hospitalizations (0.13 ± 0.38 vs. 0.97 ± 2.34). COTE Index ≥ 4; no significant changes after 5 years: 23.53% (n16) vs. 29.41% (n20). In 2020, an increase in arterial hypertension (AHT) (66% n45 vs. 77%, p0.181), depression (19.12% n13 vs. 30.30% n20, p0.161) and anxiety (22.06% n15 vs. 32% n21, p0.243) was detected. In 2020, 3.03% of patients (n2) were diagnosed with abdominal aortic aneurism. Decrease in obesity from 25% (n17) to 19.70% of patients (n13). During follow-up, 9 patients died (13.24%), and they had fewer comorbidities ($p < 0.009$). Higher mortality in patients with COTE Index ≥ 4 (p0.429). Deceased patients had more severe COPD, with lower post-BD FEV1 after 5 years (p0.102). Patients with cardiovascular or metabolic disease had a lower mortality rate at 5 years ($p < 0.05$). Although patients with a COTE Index ≥ 4 in 2015 had a lower mean post-BD FEV1 at baseline and after the 5-year follow-up, the difference wasn't significant. It was observed that the COTE Index increased in patients with COPD with post-BD FEV1 of moderate to severe degree ($p < 0.05$).
Discussion: The comorbidities of COPD constitute a prognostic factor with a cumulative effect on morbidity and mortality. Hence, the importance of this study. One limitation is the small population size, which could explain the lack of correlation between mortality

Rev Am Med Resp 2023;23: 75-83
https://doi.org/ 10.56538/ramr.WBJZ3403

*Hospital Privado Universitario de Córdoba

and increased comorbidities. We highlight the overuse of ICS and systemic steroids in this population, despite not experiencing increased exacerbations or hospitalizations.
Conclusions: After a 5-year follow-up of this COPD population with comorbidities, a statistically significant increase in AHT, depression, and anxiety was detected. 3.03% of patients were diagnosed with abdominal aortic aneurism. There was 13.24% mortality after 5 years. There was a significant correlation between the severity of COPD and a COTE Index ≥ 4, but neither of these variables correlated with mortality. Our main limitation was the small cohort included in this study.

Key word: Pulmonary Disease, Chronic Obstructive; Indicators of Morbidity and Mortalit

RESUMEN

Objetivos: Evaluar la evolución de las comorbilidades en una cohorte de pacientes EPOC durante 5 años de seguimiento. Evaluar la mortalidad. Valorar y correlacionar la gravedad de la EPOC, el índice de COTE y la mortalidad.
Material y Métodos: Estudio prospectivo observacional en una cohorte de pacientes EPOC durante 2015-2020, en el Servicio de Neumonología Hospital Privado Universitario de Córdoba. Información de Historias Clínicas electrónicas. Para predecir riesgo de mortalidad se utilizó el índice de COTE. Análisis estadístico: prueba exacta de Fisher, Prueba t de Student e InfoStat.
Resultados: Sesenta y ocho pacientes, masculinos 37 (54,41%), edad 75 ± 6,69. Sin seguimiento: 2 pacientes. En el momento del ingreso, el tiempo del diagnóstico de EPOC fue de 13,23 ± 5,88 años. Más del 50% tenían EPOC moderado. Sin diferencias en VEF1/post-BD (0,57 en 2015 vs. 0,58 en 2020), ni en frecuencia de exacerbaciones en último año (1,06 ± 1,26 vs. 0,85 ± 1,44). En 2015, el 29,41% (n 20) eran TBQ activos y se redujo al 18,18% (n 12). En 2015, recibían CI el 73,53% (n 50) y en 2020 el 56,92% (n 37) (p 0,047). En 2015, un 4,41% (n 3) recibían esteroides sistémicos y se incrementó al 20% (n 13) en 2020 (p 0,007). Sin diferencias significativas en frecuencia de internaciones (0,13 ± 0,38 vs. 0,97 ± 2,34). índice de COTE ≥ 4, no se modificó significativamente a los 5 años: el 23,53% (n 16) vs. el 29,41% (n 20). Se detectó en 2020, un incremento de HTA (el 66%, n 45 vs. el 77%, p 0,181), depresión (el 19,12%, n 13 vs. el 30,30%, n 20, p 0,161) y ansiedad (el 22,06%, n 15 vs. el 32%, n 21, p 0,243). En 2020, diagnóstico de aneurisma de aorta abdominal en el 3,03% (n 2). Reducción de obesidad en el 25% (n 17) al 19,70% (n 13). En el seguimiento, fallecieron 9 pacientes (13,24%) y tenían menos comorbilidades (p < 0,009). Mayor mortalidad en pacientes con índice de COTE ≥ 4 (p 0,429). Los fallecidos tenían mayor gravedad de la EPOC, con menor VEF1/post-BD a 5 años (p 0,102). Aquellos con enfermedad cardiovascular o metabólica, a los 5 años, tenían menor proporción de fallecimiento (p < 0,05). Si bien los pacientes con índice de COTE en 2015 ≥ 4 presentaban menor promedio de VEF1/post-BD al comienzo y en seguimiento a 5 años, la diferencia no fue significativa. Se observó que el índice de COTE aumentaba en pacientes EPOC con VEF1/post-BD de grado moderado y grave (p < 0,05).
Discusión: Las comorbilidades de la EPOC constituyen un factor pronóstico con efecto acumulativo en morbimortalidad; por ello, la importancia de este estudio. Una limitación es la reducida población, que podría explicar que no se observó correlación entre mortalidad y aumento de comorbilidades. Destacamos el sobreuso de CI y esteroides sistémicos en esta población, a pesar de no tener incremento de exacerbaciones ni internaciones.
Conclusiones: En 5 años de seguimiento de esta población EPOC con comorbilidades, se detectó un incremento de la HTA, depresión y ansiedad estadísticamente significativos. En un 3,03%, se diagnosticó aneurisma de aorta abdominal. La mortalidad a los 5 años fue del 13,24%. Hubo una correlación significativa entre la gravedad de la EPOC y el índice de COTE ≥ 4, pero ninguna de estas variables se correlacionó con la mortalidad. Nuestra principal limitación fue la reducida cohorte incluida.

Palabras clave: Enfermedad Pulmonar Obstructiva Crónica; Indicadores de Morbimortalidad

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a complex, multi-component, heterogeneous disease with clinical, functional, and radiological manifestations that vary significantly from patient to patient, despite having a similar airflow obstruction.[1]

The associated comorbidities can be causally related, with smoking as a common risk factor (ischemic heart disease or lung cancer), secondary to a complication of COPD (pulmonary arterial hypertension or heart failure), or they can be associated with advanced age (such as AHT, diabetes mellitus).[2,3]

It is important to highlight that the symptoms of comorbidities can be similar to those of COPD and may be underestimated, for example, dyspnea in heart failure and lung cancer, or depression, which causes fatigue and reduces physical activity.[3]

Comorbidities are a prognostic factor with a cumulative effect on mortality. The Multidimensional COTE Index, which complements the well-accepted BODE Index (body-mass index, airflow obstruction, dyspnea, and exercise capacity), is a predictor of mortality risk that could be used to quantify the burden of comorbidities in both clinical and research settings.[4, 5, 6]

The relationship between COPD and the comorbidities is not fully understood. However, a connection has been suggested through the inflammatory pathway, given the persistent low-grade inflammation, both pulmonary and systemic, which are known risk factors for cardiovascular disease and lung cancer and are present in COPD, regardless of the smoking status.[7]

Comorbidities are common across all severities of COPD. Despite the negative impact of multiple comorbidities in COPD, COPD itself is one of the most important comorbid conditions that adversely affect the course of other diseases, such as heart failure in hospitalized patients or coronary revascularization surgery, leading to increased morbidity and mortality when COPD is present.[3]

In the population-based PLATINO study, which examined the prevalence of COPD in five cities in Latin America, it was concluded that in an unselected population, individuals with COPD have more comorbidities. Age, female gender, and higher body mass index (BMI) were identified as the main factors associated with comorbidities in these patients with COPD.[8]

In recent years, there has been an increased interest in understanding the influence of comorbidities in COPD patients, with the ultimate goal of reducing morbidity and mortality.[2]

There is indeed sufficient evidence that comorbidities in COPD not only contribute to increase symptoms, impair exercise capacity, and reduce quality of life with a high economic burden of the disease but also serve as a prognostic factor with a cumulative effect on mortality. For this reason, it was considered important to conduct a follow-up on this population to assess their evolution.

OBJECTIVES

1. To evaluate the progression of comorbidities in a cohort of COPD patients after 5 years of follow-up at the Pulmonology Service of the Hospital Privado Universitario de Córdoba.
2. To evaluate the mortality rate in a group of patients.
3. To assess and correlate the severity of COPD with the COTE Index, and both of them with the mortality.

MATERIALS AND METHODS

1) Patients and data collection

Prospective observational study that evaluated a cohort of patients diagnosed with COPD during 2015-2020 who were attended at the Pulmonology Service of the Hospital Privado Universitario de Córdoba.

We considered the **COPD** definition provided by the GOLD 2021 (Global Initiative for Chronic Obstructive Pulmonary Disease): *" common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development. Significant comorbidities may have an impact on morbidity and mortality."*

The spirometric criterion for diagnosing COPD according to the GOLD 2021 is based on a *"post-bronchodilator forced expiratory volume in one second (FEV1)/ forced vital capacity (FVC) ratio of less than 0.7."*

The GOLD 2017 classification was considered for the analysis of the severity of COPD. (Figure 1)

According to the World Health Organization (WHO), "**comorbidity**" is defined as the simultaneous occurrence of two or more diseases in the same person. This definition aligns with what was published by Feinstein A. in 1970.

The information was obtained from the electronic medical records of COPD patients. Data collection was performed using an ad-hoc spreadsheet, which included the following information:

- Patient information (age, sex, weight, height, BMI)
- Spirometric data

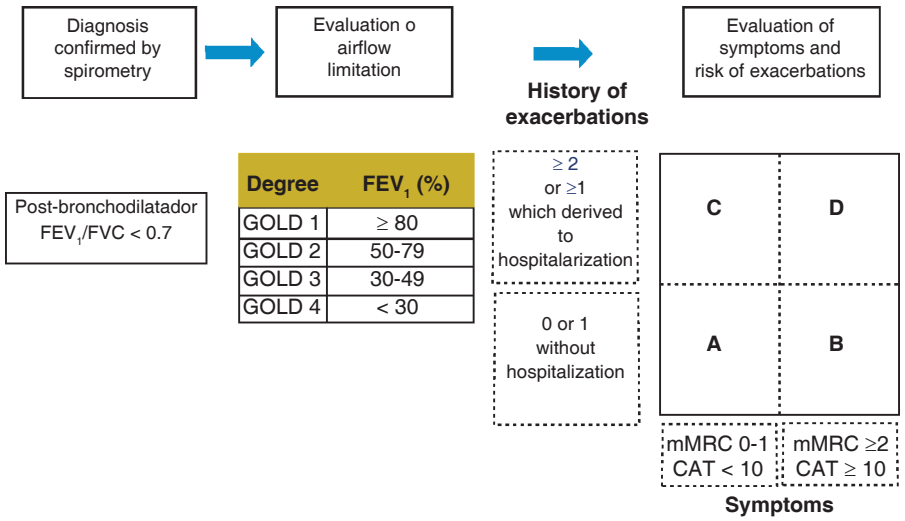

Fig. 1. GOLD 2017 classification
CAT: COPD Assessment Test. Available at: https://www.catestonline.org/patient-site-test- page-spanish-spain.html. FEV1: forced expiratory volume in 1 second; FVC: forced vital capacity; GOLD: Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease. 2017 report.

- Smoking habits (current smoker, former smoker, smoking load determined by the "pack-years")
- Status of respiratory condition (years since diagnosis, degree of severity, number of exacerbations and hospitalizations in the past 12 months, current medical treatment)
- Known comorbidities documented in the latest pulmonary medical check-up. The following were included:
  - Cardiovascular diseases (CVDs): AHT, heart failure (HF), ischemic heart disease (IHD), atrial fibrillation (AF), peripheral vascular disease (PVD), pulmonary hypertension (PHT), valvular heart disease, abdominal aortic aneurysm (AAA).
  - Metabolic diseases: diabetes mellitus (DM), obesity, dyslipidemia (DL), hyperuricemia, hypothyroidism, malnutrition.
  - Digestive diseases: gastroesophageal reflux disease (GERD), gastric or duodenal ulcer, liver cirrhosis, gastritis.
  - Musculoskeletal diseases: osteoporosis, osteoarthritis, sarcopenia.
  - Psychiatric disorders: depression, anxiety, sleep disorders.
  - Oncological diseases: lung cancer, esophageal cancer, stomach cancer, pancreatic cancer, colon cancer, prostate cancer, breast cancer.
  - Other diseases: ophthalmologic, hematologic, anomalies of the kidney and urinary tract, and other pulmonary conditions.
- Deceased patients
- COTE Index

In order to predict the mortality risk at 5 years, we used the Multidimensional COTE Index, which consists of the most common comorbidities in patients with COPD. A total score of 24 points indicates that the higher the score the greater the number of comorbidities that predict mortality in COPD.[4, 5, 6]

An increase in the COTE Index was associated with a higher risk of COPD-related death (hazard ratio [HR], 1.13; 95% confidence interval, 1.08-1.18; P, 0.001) as well as non-COPD-related causes of death (HR, 1.18; 95% confidence interval, 1.15-1.21; P, 0.001). Additionally, the increase in this index was independently associated with an increased risk of death.[4-6]

A COTE score greater than or equal to 4 points increased the risk of death by 2.2 times (HR, 2.26-2.68; P, 0.001). (Table 1) [4-6]

2) Statistical analysis

A descriptive analysis of the recorded variables was conducted. To relate the number and type of comorbidities to the degree of severity of COPD, a multivariate correspondence analysis was carried out. The statistical analysis was conducted using the InfoStat 2014e program. A value of $p < 0.05$ was considered to be significant.

For inferential statistics, the Fisher's exact test was used for studying the relationship between categorical variables in 2x2 tables.

To analyze the difference between quantitative variables, the Student's t test was used for independent samples with one-tailed significance, and the nonparametric Mann-Whitney U test and the Kruskal-Wallis test were used in cases where the normal distribution of variables could not be assumed.

Lastly, the SPSS for Windows v.22 was used for statistical analyses, and the usual significance level of 0.05 was applied in all cases.

RESULTS

68 patients were included, 37 male (54.41%), age 75±6.69. Two patients were lost to follow-up during the 5-year period.

As shown in Table 2, at the study entry, the time elapsed since the COPD diagnosis of the entire

TABLE 1. Comorbidities and point values used for the computation of COTE index

Comorbidity	Hazard ratio	Point Asignment
Lung, esophageal, pancreatic, and breast* cancer	> 2.00	6
Anxiety*	13.76	6
All other cancers		2
Liver cirrhosis	1.68	2
Atrial fibrillation/flutter	1.56	2
Diabetes with neuropathy	1.54	2
Pulmonary fibrosis	1.51	2
Congestive heart failure	1.33	1
Gastric/duodenal ulcers	1.32	1
Coronary artery disease	1.28	1

Hazard ratio <1.5 = 1, ≥ 1.5 = 2, and 6 for lung, pancreatic, esophageal, and breast cancer, similar to the value assigned in the Charlson Comorbidity.
*Valid on the female population only

TABLE 2. Population distribution (2015-2020) according to age, COPD characteristics and COTE Index. SD: standard deviation

Variable	Mean	Median	SD	N
Age (2015)	70.60	71	6.92	68
Age (2020)	75.26	75	6.69	66
Years since COPD diagnosis	13.23	11.5	5.88	66
Post-BD FEV1 (2015)	0.57	0.56	0.17	68
Post-BD FEV1 (2020)	0.58	0.58	0.19	66
No. of exacerbations during previous year (2015)	1.06	1	1.26	68
No. of exacerbations during previous year (2020)	0.85	0	1.44	65
No. of hospitalizations during previous year (2015)	0.13	0	0.38	68
No. of hospitalizations during previous year (2020)	0.97	0	2.34	65
Smoking load (pack-years) (2015)	82.45	50	129.00	66
Smoking load (pack-years) (2020)	60.70	40	105.17	63
COTE Index (2015)	2.26	1.5	3.05	68
COTE Index (2020)	2.66	2	3.20	68

More than 50% of patients (2015 n37 and 2020 n35) had moderate COPD, as shown in Figure 2

population was 13.23 ± 5.88 years. Regarding the post-BD FEV_1, there were no differences after 5 years (mean of 0.57 in 2015 vs. 0.58 in 2020). Furthermore, in relation to exacerbations in the last year, there were no significant differences during the 5-year follow-up (1.06 ± 1.26 vs. 0.85 ± 1.44). There weren't any differences, either, in the frequency of hospitalizations in the last year (0.13 ± 0.38 vs. 0.97 ± 2.34).

In 2015, 29.41% (n20) of the patients were active smokers, and this percentage was reduced to 18.18% (n12) due to smoking cessation after 5 years (p 0.157), as observed in Table 2.

Regarding the treatment, in 2015, 73.53% (n50) of patients were receiving inhaled corticosteroids (ICS), and after 5 years, this percentage decreased to 56.92% (n37) (p 0.047). Only 7.5% (n5) received LABAs (long-acting beta agonists) at study entry, and this percentage did not change during the subsequent follow-up period. It was also observed that in 2015, 4.41% (n3) of patients were receiving systemic steroids, and this percentage increased to

20% (n13) after 5 years. The cause of this change was not specified in the medical record (p 0.007). The COTE Index, with a cutoff point of ≥4, did not show statistically significant changes over the 5-year follow-up period: 23.53% (n16) vs. 29.41% (n20) (Table 2).

Regarding comorbidities, over the 5-year follow-up period, an increase in the diagnosis of hypertension (AHT) was detected (66% n45 vs. 77% n51, p 0.181). There were 2 cases of abdominal aortic aneurysm (AAA) in 2020 (3.03%), and increase in depression (19.12% n13 vs. 30.30% n20, p 0.161) and anxiety (22.06% n15 vs 32% n21, p 0.243). Regarding obesity, a reduction was detected from 25% (n17) to 19.70% (n13).

During the 5-year follow-up, 9 patients (13.24%) died. After the 5-year period, it was observed that this group had fewer comorbidities, with statisti-

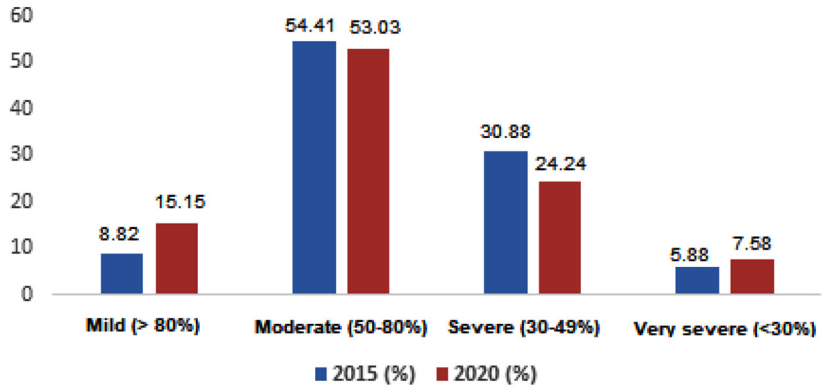

Fig. 2 Population distribution according to the evolution of the post-BD FEV1 (% of patients) 2015-2020

TABLE 3. Population distribution according to changes in smoking habits, COPD medical treatment and dichotomized COTE Index (2015-2020)

	2015		2020	
	Patients	%	Patients	%
Semoking				
Former smoker	47	69.12	52	78.79
Current smoker	20	29.41	12	18.18
COPD treatment				
LABAs (long-acting beta agonists)	50	73.53	37	56.92
LAMAs (long-acting muscarinic antagonists)	63	92.65	60	92.31
IPD4 (Inhibitor of phosphodiesterase 4)	47	70.15	50	76.92
SABAs (short-acting beta agonists)	4	5.97	5	7.69
SAMAs (short-acting muscarinic antagonists)	2	2.99	9	13.85
SABA/SAMA	5	7.46	13	20.00
Systemic corticosteroids	23	33.82	6	9.23
Theophyllines	3	4.41	13	20.00
Teofilinas	1	1.49	1	1.54
COTE Index				
< 4	52	76.47	48	70.59
≥ 4	16	23.53	20	29.41

cal significance ($p < 0.009$), as shown in Figure N 3. There was a higher mortality rate in patients with a COTE index ≥4, but it was not statistically significant (p 0.429). The patients who died showed a lower post-BD FEV_1 at 5 years, but the difference between the groups was not statistically significant (p 0.102). Although the difference wasn't statistically significant, it was observed that increased severity of COPD was associated with a higher mortality rate. Patients with cardiovascular or metabolic disease had a lower rate of deaths at 5 years, and the relationship between these variables is statistically significant ($p < 0.05$).

Although patients with a COTE Index ≥4 in 2015 had a lower mean post-BD FEV_1 at baseline and at 5-year follow-up, the difference between the groups wasn't statistically significant ($p>0.05$). It was observed that the COTE Index increases in patients with COPD with post-BD FEV_1 of moderate and severe degree, and the difference is statistically significant ($p< 0.05$), as shown in Figure 5.

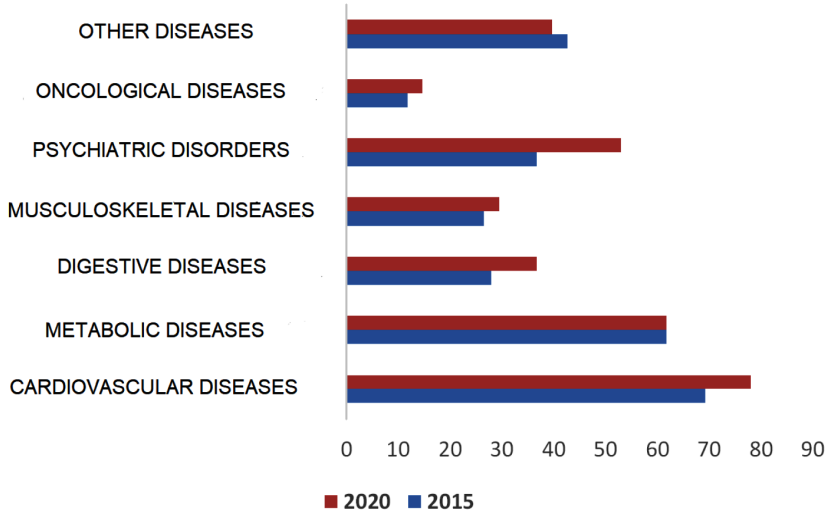

Figure 3. Population distribution according to changes in the percentage of comorbidities (2015-2020).

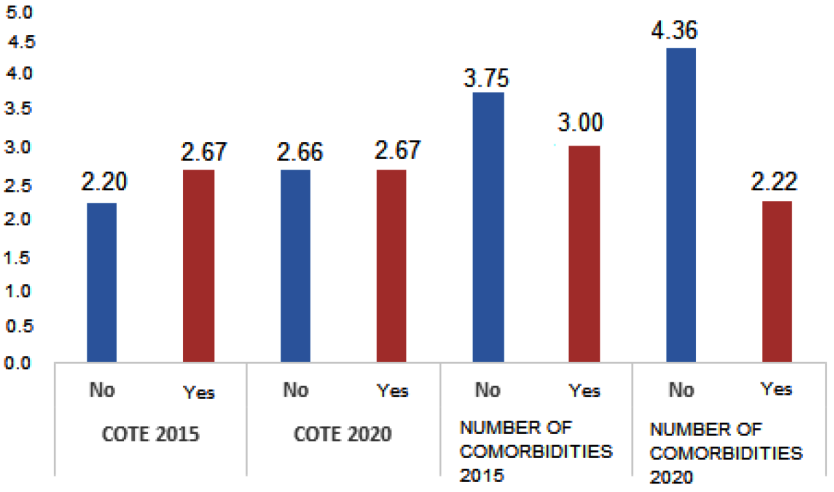

Figure 4. Population distribution according to mortality (yes-no) in relation to the COTE Index and the number of comorbidities (2015-2020).

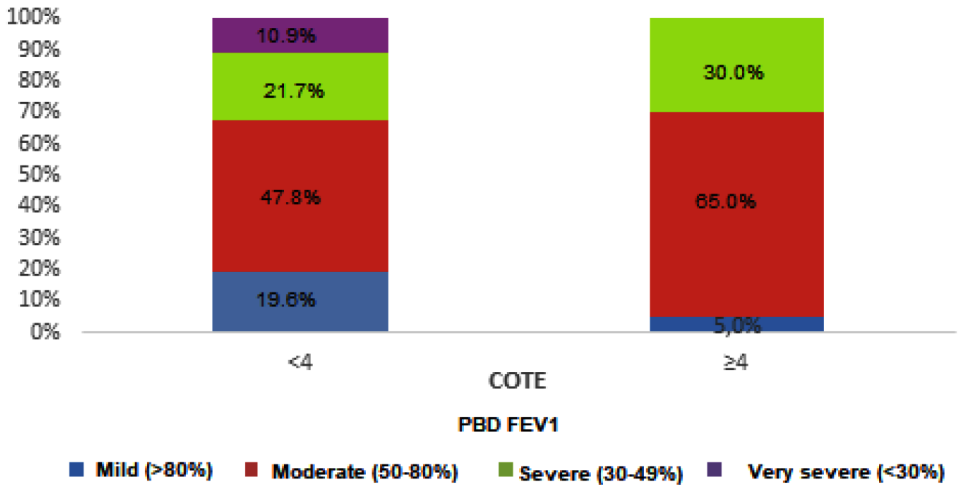

Figure 5 .Population distribution (2020) according to the correlation between the COTE Index and the post-BD FEV1

DISCUSSION

The importance of this study was the follow-up of patients with COPD and comorbidities over a period of 5 years. In our population, more than 50% of all COPD patients were classified as moderate, similar to what was observed in the EPOC AR study (52%).

With regard to the treatment, it is concerning that the use of systemic steroids increased during the follow-up period, despite the fact that no increase in exacerbations was observed in the study group. However, the use of ICS decreased after 5 years (73.53% vs. 56.92%), and one possible explanation could be that the guidelines are being followed. On the other hand, it is noteworthy that 7.35% of patients were not receiving LABAs, and that this medication wasn't subsequently incorporated into their treatment.

There is no doubt that comorbidities have an impact on the overall health status, the use of healthcare resources, hospitalizations, and mortality of patients with COPD. In fact, while the most common cause of death in COPD patients with advanced disease is respiratory in origin, in individuals with mild to moderate COPD, mortality is associated with cardiovascular comorbidities and lung cancer.[8]

In the PLATINO study, the reported comorbidities were (in decreasing order of frequency): any cardiovascular disease (41.5%), hypertension (37.2%), peptic ulcer disease (31.8%), asthma (22.8%), heart disease (13.7%), diabetes (8.4%), stroke (3.2%), and lung cancer (1.1%). These results align with studies indicating that cardiovascular problems are among the most common comorbid conditions in COPD.[6] After the 5-year follow-up, we detected in our population a non-significant increase in AHT (66% vs. 77%), depression (19.12% vs. 30.30%), and anxiety (22.06% vs. 32%), and we also observed the occurrence of AAA in 2020 (3.03%).

The curvilinear relationship between comorbidity score and BMI observed in the group of COPD individuals allows us to speculate about the adverse effect of underweight in these patients (unhealthy underweight).[8] In the study group, it was observed that obesity decreased during the 5-year follow-up (25% vs. 19.70%), which could be a factor associated with a poor prognosis.

Divo et al mention a higher risk of death associated with the presence of pulmonary fibrosis, peptic ulcer disease, and liver cirrhosis, but no increased risk of atrial fibrillation (AF) was observed. These findings raise the possibility of a close interaction between these diseases, which may share common biological pathways.[4-6]

Although hypertension, hyperlipidemia, and obstructive sleep apnea are highly prevalent, the direct risk of death attributable to these conditions is not significant. They propose that the most likely reason is that all these conditions are treatable or

not significant risk factors for the development of more lethal diseases, such as coronary artery disease. While neoplasms in general confer a significant risk of death, lung cancer is the one that most frequently shows an aggregated prevalence of 9%. One striking finding they encountered was the relatively high prevalence of interstitial pulmonary fibrosis (6%) and its strong independent association with the risk of death.[4-6]

Liver cirrhosis and anxiety were also associated with a higher risk of death, suggesting certain correlation with the lifestyle and social behavior of this population. The mechanisms by which anxiety was identified as a risk factor for mortality in COPD patients, particularly in females, are still unknown. However, it was found that anxiety has an impact on the rate of exacerbations and hospitalizations. We observed an increase in anxiety, though it wasn't statistically significant. The risk of by peptic ulcer disease is very interesting in view of the findings reported by researchers of the ECLIPSE[1] study, where one of the predictors of frequent exacerbations in COPD was the presence of gastroesophageal reflux.[4-6]

At the 5-year follow-up, 9 patients (13.24%) died. Unlike what has been observed in other studies, the deceased patients in this series had fewer comorbidities ($p < 0.009$). However, the mortality rate was higher, though not statistically significant, in patients with a COTE index ≥ 4 and a higher degree of obstruction as evaluated by FEV_1. In contrast to what has been published in the literature, we observed that patients with cardiovascular or metabolic disease had a lower proportion of mortality after 5 years ($p < 0.05$). Although the difference wasn't statistically significant, it was observed that increased severity of COPD was associated with a higher mortality rate.

As observed in other studies, patients with a COTE Index ≥ 4 in 2015 had a lower mean post-bronchodilator FEV_1 at baseline and at the 5-year follow-up, but this finding did not reach statistical significance ($p>0.05$).

One of the main limitations of this study is the small population size, which could explain the lack of correlation between mortality and increased comorbidities.

CONCLUSIONS

In the 5-year follow-up, there was an increase in AHT, depression, and anxiety, but these changes were not statistically significant. A total of 3.03% of the population was diagnosed with AAA by the end of the study.

The overall mortality rate at the end of the study was 13.24%.

There was a statistically significant correlation between the severity of COPD and a COTE Index ≥ 4, but neither of these variables correlated with mortality.

Our main limitation was the small cohort included in this study.

REFERENCES

1. Agusti A, Calverley PM, Celli B, , et al. Characterisation of COPD heterogeneity in the ECLIPSE cohort. Respir Res. 2010;11:122. https://doi.org/10.1186/1465-9921-11-122
2. de Miguel Díez J, García TG, Maestu LP. Comorbilidades de la EPOC. Arch Bronconeumol. 2010 Dec;46 Suppl 11:20-5. https://doi.org/10.1016/S0300-2896(10)70058-2
3. https://goldcopd.org 2021
4. Divo M, Cote C, de Torres JP, Casanova C, et al. Comorbidities and risk of mortality in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2012;186:155-61. https://doi.org/10.1164/rccm.201201-0034OC
5. Jimenez JJ Sívori M. Comparación de los índices de Charlson y COTE en la enfermedad pulmonar obstructiva crónica (EPOC) y su relación con la mortalidad. Rev Am Med Resp 2022;1:3-9.
6. Stolz D, Louis R, Boersma W, et al. COPD-specific comorbidity test (COTE) for predicting mortality in COPD – Results of an European, multicenter study. Eur Respir J. 2014;44:P566.
7. Sin DD, Anthonisen NR, Soriano JB, Agusti AG. Mortality in COPD: Role of comorbidities. Eur Respir J. 2006;28:1245-57. https://doi.org/10.1183/09031936.00133805
8. López Varela MV, Montes de Oca, Halbert R, Muiño A, Tálamo C, Pérez-Padilla R, el al. Comorbilidades y estado de salud en individuos con y sin EPOC en 5 ciudades de América Latina: Estudio PLATINO. Arch Bronconeumol. 2013; 49:468–74. https://doi.org/10.1016/j.arbres.2013.05.003
9. Echazarreta AL, Arias SJ, Del Olmo R, et al. Prevalence of COPD in 6 Urban Clusters in Argentina: The EPOC. AR Study. Arch Bronconeumol (Engl Ed). 2018;54:260-9. https://doi.org/10.1016/j.arbr.2017.09.017