ORIGINAL RESEARCH

COPD severity in some provinces of the Department of Boyacá (Colombia) according to the ALAT 2019 and GOLD 2022 guidelines

Severidad de la EPOC en algunas provincias del departamento de Boyacá (Colombia) según las guías ALAT 2019 y GOLD 2022

María del Pilar Rojas-Laverde[1] iD   Sandra Patricia Corredor-Gamba[1] iD   Alba Yanira Polanía-Robayo[1] iD
Marcela América Roa-Cubaque[1] iD

[1] Universidad de Boyacá - Faculty of Health Sciences - Respiratory Therapy Program - Tunja - Colombia.

Abstract

Introduction: Chronic obstructive pulmonary disease (COPD) is a condition that progressively limits the ability to perform exercise and activities of daily living, negatively impacting quality of life.
Objective: To determine the severity of COPD according to the criteria of the Latin American COPD Clinical Practice Guidelines (ALAT 2019) and the Global Initiative for Chronic Obstructive Lung Disease (GOLD 2022) pocket guide for the diagnosis, treatment, and prevention of COPD in patients suffering from this condition in Boyacá, Colombia.
Materials and methods: A retrospective, descriptive, cross-sectional, correlational study was carried out in 248 COPD patients from municipalities in the Central and Sugamuxi provinces of the department of Boyacá (Colombia). Sociodemographic and clinical data were collected, spirometry was performed, and the modified Medical Research Council (mMRC) dyspnea scale and the COPD assessment questionnaire (CAT) were administered. The Kruskal-Wallis test was used to evaluate the association of the clinical and sociodemographic variables considered with the classification of COPD severity according to the criteria of the ALAT 2019 and GOLD 2022 guidelines.
Results: According to the ALAT guideline criteria, COPD was mild in 109 (43.95%) patients, moderate in 104 (41.93%), and severe in 35 (14.11%). Meanwhile, according to the GOLD guidelines, 108 (43.55%) had GOLD-1 COPD, 106 (42.74%) had GOLD-2 COPD, and 34 (13.71%) had GOLD-3 COPD; no cases of GOLD-4 COPD were reported. In addition, 99.06% of patients with mild COPD were classified as COPD GOLD-1 (81.65% in the GOLD-1A group), 98.06% of cases with moderate COPD were classified as COPD GOLD-2 (54.80% in the GOLD-2B group), and 91.42% of subjects with severe COPD were classified as COPD GOLD-3 (62.85% in the GOLD3D group).
Conclusions: COPD severity can be classified using both the ALAT and GOLD guidelines, since the distribution of COPD types depending on severity was similar in both guidelines (mild, moderate, severe vs. GOLD-1, GOLD-2, GOLD-3), with mild COPD-GOLD-1 being the most frequent classification in our sample, followed by moderate COPD-GOLD-2.

Resumen

Introducción. La enfermedad pulmonar obstructiva crónica (EPOC) es una condición que limita progresivamente la capacidad para realizar ejercicio y actividades de la vida diaria, impactando negativamente la calidad de vida.
Objetivo. Determinar la severidad de la EPOC según los criterios de la Guía de Práctica Clínica Latinoamericana de EPOC (ALAT 2019) y la guía de bolsillo para el diagnóstico, manejo y prevención de la EPOC de la Global Initiative for Chronic Obstructive Lung Disease (GOLD 2022) en pacientes con EPOC en Boyacá, Colombia.
Materiales y métodos. Estudio transversal descriptivo correlacional realizado en 248 pacientes con EPOC de municipios de las provincias Centro y Sugamuxi del departamento de Boyacá. Se recolectaron datos sociodemográficos y clínicos, se realizó espirometría y se aplicaron la escala modificada de disnea del Medical Research Council (mMRC) y el cuestionario de evaluación de la EPOC (CAT). Se usó la prueba de Kruskal-Wallis para evaluar la asociación de las variables clínicas y sociodemográficas consideradas con la clasificación de la severidad de la EPOC según los criterios de las guías ALAT 2019 y GOLD 2022.
Resultados. Según los criterios de la guía ALAT, 109 (43.95%) pacientes tenían EPOC leve; 104 (41.93%), EPOC moderada, y 35 (14.11%), EPOC grave, mientras que, de acuerdo con la guía GOLD, 108 (43.55%) tenían EPOC GOLD-1; 106 (42.74%), EPOC GOLD-2, y 34 (13.71%), EPOC GOLD-3; no hubo casos de EPOC GOLD-4. Además, 99.06% de los pacientes con EPOC leve fueron clasificados como EPOC GOLD-1 (81.65% en el grupo GOLD-1A); 98.06% de aquellos con EPOC moderado, como EPOC GOLD-2 (54.80% en el grupo GOLD-2B), y 91.42% de aquellos con EPOC grave, como EPOC GOLD-3 (62.85% en el grupo GOLD3D).
Conclusiones. La clasificación de la severidad de la EPOC puede realizarse tanto con la guía ALAT, como con la guía GOLD, dado que la distribución de los tipos de EPOC según su severidad fue similar en ambas guías (leve, moderada, grave vs. GOLD-1, GOLD-2, GOLD-3), siendo la EPOC leve-GOLD-1 la clasificación más frecuente en nuestra muestra, seguida de la EPOC moderada-GOLD-2.

Introduction

Chronic obstructive pulmonary disease (COPD) refers to a group of diseases, such as emphysema and chronic bronchitis, that cause airflow obstruction and breathing problems due to damage to the airways or other parts of the lung.[1,2] It is diagnosed by spirometry, a test that measures lung function and allows detecting the disease even in people who do not exhibit any symptoms at the moment.[1-3] While exposure to tobacco smoke (either as an active or passive smoker) has been reported to be the most common cause, other risk factors include exposure to air pollutants (both at home and in the workplace), genetic diseases, and respiratory infections.[1-4]

The most common symptoms of COPD are shortness of breath, mucus, chronic cough (sometimes with sputum), and fatigue.[2,4] Patients with this disease are also at increased risk for other health problems such as lung infections, lung cancer, heart disease, depression and anxiety,[4] and are also more likely to experience limitations in activities of daily living (e.g., difficulty walking or climbing stairs), need special equipment such as portable oxygen tanks, and be unable to work.[2]

Although there is currently no cure for COPD, available treatments, as well as care-oriented lifestyle changes, can alleviate symptoms and prevent acute worsening of the disease by reducing the frequency and severity of exacerbations.[1,4]

COPD is one of the leading causes of morbidity and mortality in the world.[1,5] Moreover, because the treatment of these patients entails high costs, both economic and in terms of health care resources, this chronic disease has become a worldwide public health problem.[6] According to the World Health Organization, COPD is the third leading cause of death worldwide, with 3.23 million deaths in 2019, and the seventh leading cause of ill health (measured by disability-adjusted life years).[4] In addition, it is estimated that COPD will be one of the leading causes of death worldwide by 2030.[3]

In Colombia, chronic non-communicable diseases (NCDs), including COPD, are among the leading causes of years of healthy life lost due to premature illness and disability.[7] In 2008, Caballero et al.[8] published a study in which they reported that the overall prevalence of COPD (defined by functional spirometric criteria) in 5 Colombian cities (Barranquilla, Bogotá, Bucaramanga, Cali, and Medellín) was 8.9%. Eleven years later, Gil-Rojas et al.[9] reported that aged-adjusted prevalence, underreporting, misdiagnosis and mortality for COPD in the country between 2010 and 2015 was 5.13% and, according to geographic distribution, the regions with the highest prevalence were Risaralda, Bogotá, Boyacá, Quindío, Caldas, and Antioquia.[9] In Boyacá, as per the departmental health ministry, the leading cause of morbidity during the 2009-2018 period was non-communicable diseases (68.6%).[10] However, it has also been described that, despite the high mortality and prevalence rates of COPD, it is currently still an underdiagnosed and, consequently, undertreated disease, with underdiagnosis figures of up to 81.7%.[6]

The clinical course of COPD is associated with repeated episodes of exacerbation that are rare in early COPD, but common in moderate or severe stages. They are a major cause of morbidity and mortality, deterioration of health status, loss of productivity, and use of health system resources.[11,12]

Clinical practice guidelines are statements that include recommendations aimed at optimizing patient care, which are based on a systematic review of the evidence and an assessment of the benefits and costs of alternative care options. Since clinical practice guidelines can enhance physician and patient decision-making, they are a critical resource for medical specialty societies, disease advocacy groups, health professionals, organizations that develop or use clinical practice guidelines, consumers, physicians, and payers.[13]

Considering the foregoing, the objective of the present study was to determine COPD severity according to the criteria of the Latin American COPD Clinical Practice Guide (ALAT 2019)[14] and the Global Initiative for Chronic Obstructive Lung Disease (GOLD 2022)[15] pocket guide for the diagnosis, treatment, and prevention of COPD in patients with this condition in Boyacá, Colombia.

Materials and methods

Study type

Retrospective, descriptive, cross-sectional, correlational study.

Study population and sample

The study population consisted of patients with a diagnosis of COPD (ICD-10 code) (N=25 450) who were treated between 2015 and 2017 in the health service provider institutions (IPS by its Spanish acronym) of the municipalities of the Central and Sugamuxi provinces of the department of Boyacá. Sample size was calculated taking into account the information provided by the Information System of the Boyacá Health Ministry SISPRO, a prevalence of COPD in the country of 5.13%,[9] and a confidence level of 95%, obtaining a sample size of 655 patients.

Participants were recruited by stratified random sampling using the Epidat application. Patients were randomly selected from the databases provided by the IPS of each municipality and were then contacted by telephone and invited to participate in the study once the objective of the study was explained. Individuals who agreed to participate were scheduled for an appointment at their IPS to undergo spirometry, while those who did not agree to participate or did not attend the appointment were replaced by another patient, who was also randomly selected, until the required sample size was reached (Tibasosa: 11, Cuitiva: 4, Tota: 6, Iza: 5, Monguí: 5, Aquitania: 5, Mongua: 5, Tópaga: 8, Firavitoba: 4, Pesca: 6, Sogamoso: 255, Nobsa: 5, Tunja: 231, Cómbita: 14, Cucaita: 6, Chivatá: 3, Chíquiza: 5, Motavita: 2, Oicatá: 4, Samacá: 20, Siachoque: 7, Sora: 3, Soracá: 6, Sotaquirá: 7, Toca: 10, Tuta: 10, Ventaquemada: 8).

Of the 655 patients who underwent forced spirometry, 52 were excluded due to poor test quality and 355 because they did not meet the spirometric criteria for obstructive alteration (normal values or restrictive pattern). As a result, 248 patients were finally included in the study.
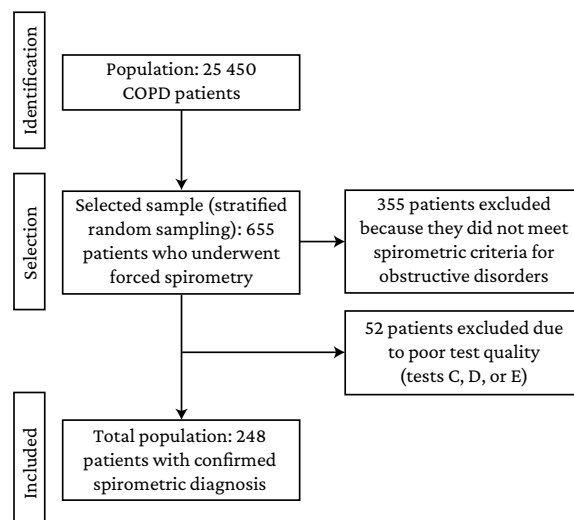

Figure 1. Flowchart of participant selection.

Data collection and variables

During the appointment, and before spirometry was performed, participants were asked to fill out an ad hoc instrument to obtain information on the following variables: age, biological sex, marital status, family support, educational attainment, height, weight, body mass index (BMI), occurrence and number of COPD exacerbations in the last year, hospitalization requirement in the last year, and risk factors such as history or presence of smoking, exposure to indoor air pollution, exposure to environmental pollution at work, history of tuberculosis, and history of respiratory infections in childhood. Additionally, data for the following variables were obtained from spirometry: forced vital capacity (FVC%), forced expiratory volume in the first second (FEV1%), and FEV1/FVC ratio.

After spirometry was performed, the modified Medical Research Council Dyspnea Scale (mMRC)[16,17] and the COPD Assessment Questionnaire (CAT)[18] were administered to assess dyspnea severity and determine the impact of the disease on the patient's life, respectively. Along with other criteria, the scores on these instruments are used by the ALAT 2019[14] and GOLD 2022[15] guidelines to establish the degree of COPD severity and airflow obstruction. Spirometry testing was performed between March 2015 and December 2017.

Regarding the classification of COPD severity, the ALAT 2019 guidelines classify the disease into 3 levels: mild COPD (mMRC scale score between 0-1, FEV1 ≥80%, and no COPD exacerbations), moderate COPD (mMRC scale score of 2, FEV1 between 79% and 50%, and at least one COPD exacerbation), and severe COPD (mMRC score 3 to 4, FEV1 <50%, and 2 or more moderate exacerbations or 1 or more hospitalizations related to the disease). In turn, the GOLD 2022 guideline establishes the following 4 severity categories: COPD GOLD-1 (mMRC scale score 0 to 1 or CAT <10, FEV1 ≥80%, and no or 1 COPD exacerbation with no hospital admission), COPD GOLD-2 (mMRC scale score ≥2 or CAT ≥10, FEV1 between 79% and 50%, and no or 1 COPD exacerbation with no hospital admission), COPD GOLD-3 (mMRC scale score 0 to 1 or CAT <10, FEV1 between 49% and 30%, and 2 or more COPD exacerbations or 1 or more hospital admissions), and COPD GOLD-4 (mMRC scale score ≥2 or CAT ≥10, FEV1 <30%, and 2 or more COPD exacerbations or 1 or more hospital admissions).

Spirometry was performed by a professional certified by the Latin American Thoracic Association using a Spirolab spirometer (reference MIR III) and following the guidelines of the American Thoracic Society. Tests meeting the criteria of acceptability and repeatability and with quality grade A or B were selected.

Statistical analysis

Data are described using absolute and relative frequencies with their respective 95% confidence intervals (95%CI) for categorical variables and means and standard deviations (SD) for quantitative variables due to the distribution of the data (Shapiro-Wilk test). Furthermore, the Kruskal-Wallis nonparametric test was used to evaluate the relationship between COPD type, according to each guideline's criteria, and sociodemographic and clinical variables, with a statistical significance level of $p<0.05$. All statistical analyses were performed in the SPSS statistical software (version 28).

Ethical considerations

The study followed the ethical principles for biomedical research involving human subjects established in the Declaration of Helsinki[19] and the scientific, technical and administrative standards for health research in Resolution 8430 of 1993 issued by the

Colombian Ministry of Health.[20] It was also approved by the Bioethics Committee of the Universidad de Boyacá according to minutes CB131 of April 16, 2015, and all patients signed an informed consent before spirometry was performed.

Results

Of the 355 patients included, 52.82% were male, the mean age was 74.8±9.46 years, and BMI was 24.82±3.61kg/m²; moreover, 41.12% were married, 56.52% had at least completed primary education, and 88.35% reported having family support. Regarding exposure to risk factors, it was found that 92.73% reported exposure to indoor air pollution, 71.04% reported exposure to environmental pollution at work, and 39.97% were smokers or former smokers (Table 1).

Table 1. Anthropometric and sociodemographic characteristics and exposure to risk factors.

Variable		N	X	SD	
Age (years)		248	74.78	9.46	
Weight (kg)		248	60.20	10.85	
Height (m)		248	1.55	0.08	
BMI		248	24.82	3.61	
Variable		**n**	**%**	**95% confidence interval**	
				Lower	Upper
Classification based on body mass index	Normal weight	135	54.43	43.18	56.08
	Overweight	92	37.10	30.99	43.00
	Obesity type I	21	8.47	4.86	12.13
Biological sex	Female	117	47.23	40.98	53.41
	Male	131	52.82	46.58	59.01
Marital status	Single	50	20.21	15.20	25.19
	Married	102	41.12	34.97	47.22
	Widowed	66	26.65	21.10	32.09
	Domestic Partnership	17	6.92	4.10	10.05
	Divorced	13	5.24	2.43	8.11
Educational attainment	Elementary	140	56.52	50.32	62.67
	Secondary	17	6.94	4.10	10.05
	Professional	1	0.42	0.02	1.28
	None	90	36.37	30.31	42.28
Family support	Yes	219	88.35	84.29	92.30
	No	29	11.76	8.12	16.15
History of tuberculosis	Yes	9	3.67	1.28	5.91
	No	239	96.40	93.59	98.71
History of respiratory infections in childhood	Yes	22	8.92	5.35	12.44
	No	226	91.14	87.55	94.64
Smoker or former smoker	Yes	99	39.97	33.80	45.99
	No	149	60.12	54.00	66.19
Exposure to indoor air pollution	Yes	230	92.73	89.46	95.93
	No	18	7.38	4.06	10.53
Exposure to air pollution at work	Yes	176	71.04	64.99	76.64
	No	72	29.01	23.35	34.64

SD: standard deviation.

As for the spirometry results, the mean FEV1% was 70.23% (±15.66); the mean FVC% was 69.46% (±8.83), and the mean FEV1/FVC ratio was 82.92% (±7.55).

With regard to the assessment of dyspnea severity with the mMRC scale, we found that 41.13% of patients had grade 3 dyspnea, 37.71% had grade 0 to 2 dyspnea, and 21.16% had grade 4 dyspnea. On the other hand, 60.08% stated that they had not presented COPD exacerbations in the last year, 30.24% indicated having one, and 9.67% had two or more. As for hospitalizations, 91.12% reported that they did not require hospitalization in the last year.

The mean score on the CAT questionnaire was 22.6 (±12.82) and, according to the CAT classification, the disease had a low impact on 44.35% of the participants, a very high impact on 38.30%, and a high impact on 17.33%.

Regarding disease severity (Figure 2), mild (ALAT) and GOLD-1 types were the most frequent (43.95% and 43.55%) and there were no GOLD-4 (very severe) cases. Importantly, similarity was found in terms of the proportion of patients in each severity category between the ALAT and GOLD classification.
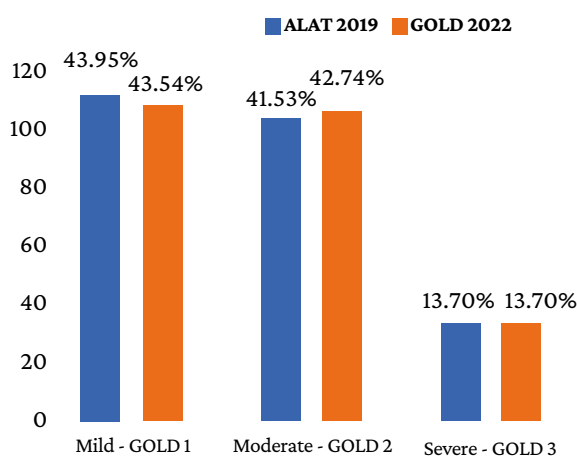
Figure 2. Classification of chronic obstructive pulmonary disease severity according to ALAT 2019 and GOLD 2022 guidelines.

Regarding the classification of disease severity, according to the ALAT guideline criteria, 43.95% (n=109) of patients had mild COPD and 41.93% (n=104) had moderate COPD (Figure 3). On the other hand, according to the GOLD guideline criteria, 43.55% (n=108) had GOLD-1 COPD and 42.74% (n=106) had GOLD-2 COPD. Concerning subcategories, group A was the most frequent in the GOLD-1 category (82.40%), while group B was the most common in the GOLD-2 category (55.66%) (Figure 4).
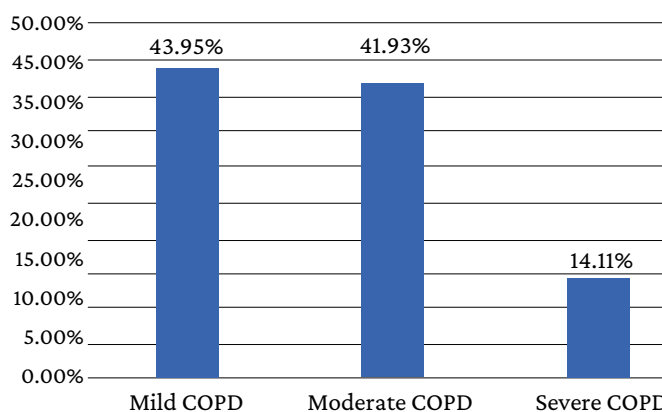

Figure 3. Classification of chronic obstructive pulmonary disease severity according to the ALAT 2019 guideline criteria.
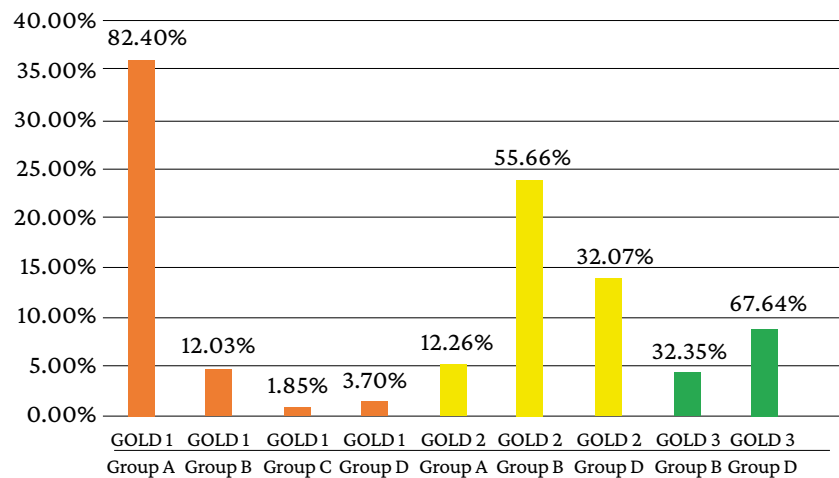
Figure 4. Classification of chronic obstructive pulmonary disease severity according to the GOLD 2022 guideline criteria.

When comparing COPD severity classifications under both guidelines, the following was found: 90.06% of patients with mild COPD were classified as COPD GOLD1 (81.65% in the GOLD-1A group); 98.06% of individuals with moderate COPD were classified as COPD GOLD2 (54.80% in the GOLD-2B group); and 91.42% of subjects with severe COPD were classified as COPD GOLD3 (62.85% in the GOLD-3D group) (Table 2).

Finally, in the bivariate analysis, a statistically significant association was observed between COPD severity classification according to the ALAT guidelines and marital status (p=0.022), family support (p=0.003), and exposure to indoor air pollution (p=0.003). In contrast, none of the variables considered was significantly associated with severity classification according to the GOLD criteria (Table 3).

Table 2. Classification of chronic obstructive pulmonary disease severity in the sample according to ALAT 2019 and GOLD 2022 guideline criteria.

ALAT	GOLD	Gold grade 1 group A	Gold grade 1 group B	Gold grade 1 group C	Gold grade 1 group D	Gold grade 2 group A	Gold grade 2 group B	Gold grade 2 group D	Gold grade 3 group B	Gold grade 3 group D	Total, ALAT classification
Mild		89 (81.65%)	13 (11.92%)	2 (1.83%)	4 (3.66)	0	1 (0.91%)	0	0	0	109 (43.95%)
Moderate		0	0	0	0	13 (12.50%)	57 (54.80%)	32 (30.76)	1 (0.96%)	1 (0.96%)	104 (41.93%)
Severe		0	0	0	0	0	1 (2.85%)	2 (5.71%)	10 (28.57)	22 (62.85)	35 (14.11%)
Total, GOLD classification		89 (82.40%)	13 (12.03%)	2 (1.85%)	4 (3.70%)	13 (12.26%)	59 (55.66%)	34 (32.07%)	11 (32.35%)	23 (67.64%)	
		108 (43.55%)				106 (42.74%)			34 (13.71%)		248 (100.00%)

Table 3. Association between clinical and sociodemographic characteristics of the sample according to the severity of chronic obstructive pulmonary disease (ALAT 2019 and GOLD 2022 guidelines criteria) and association between disease classification and sociodemographic and clinical variables. Bivariate analysis.

Variable		ALAT 2019				GOLD 2022									
		Mild (n=109)	Moderate (n=104)	Severe (n=35)	p-value	Grade 1 group A (n=89)	Grade 1 group B (n=13)	Grade 1 group C (n=2)	Grade 1 group D (n=4)	Grade 2 group A (n=13)	Grade 2 group B (n=59)	Grade 2 group D (n=34)	Grade 2 group B (n=11)	Grade 2 group D (n=23)	p-value *
		n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Biological sex	Female	57 (52.29)	46 (44.23)	13 (37.14)	0.29	48 (53.93)	7 (53.84)	2 (100.00)	1 (25.00)	7 (53.84)	21 (35.59)	18 (52.94)	4 (36.36)	7 (30.43)	0.23
	Male	52 (47.70)	58 (55.76)	22 (62.85)		41 (46.06)	6 (46.15)	0 (0.00)	3 (75.00)	6 (46.15)	38 (64.40)	16 (47.05)	7 (63.63)	16 (69.56)	
Marital status	Single	18 (16.51)	24 (23.07)	8 (22.85)	0.02	16 (17.97)	0 (0.00)	0 (0.00)	1 (25.00)	3 (23.07)	16 (27.11)	7 (20.58)	2 (18.18)	5 (21.73)	0.85
	Married	48 (44.03)	41 (39.42)	13 (37.14)		35 (39.32)	9 (69.23)	1 (50.00)	3 (75.00)	6 (46.15)	22 (37.28)	13 (38.23)	3 (27.27)	10 (43.47)	
	Widowed	29 (26.60)	25 (24.03)	12 (34.28)		26 (29.21)	1 (7.69)	1 (50.00)	0 (0.00)	3 (23.07)	13 (22.03)	9 (26.47)	6 (54.54)	6 (26.08)	
	Domestic partnership	8 (7.33)	8 (7.69)	1 (2.85)		6 (6.74)	2 (15.38)	0 (0.00)	0 (0.00)	0 (0.00)	5 (8.47)	3 (8.82)	0 (0.00)	1 (4.34)	
	Divorced	6 (5.50)	6 (5.76)	1 (2.85)		6 (6.74)	1 (7.69)	0 (0.00)	0 (0.00)	1 (7.69)	3 (5.08)	2 (5.88)	0 (0.00)	1 (4.34)	
Family support	Yes	92 (84.40)	93 (89.42)	34 (97.14)	0.00	72 (80.89)	12 (92.30)	2 (100.00)	4 (100.00)	12 (92.30)	52 (96.61)	33 (97.05)	10 (90.90)	23 (100.00)	0.06
	No	17 (15.59)	11 (10.57)	1 (2.85)		17 (19.10)	1 (7.69)	0 (0.00)	0 (0.00)	1 (7.69)	7 (11.86)	1 (2.94)	1 (9.09)	0 (0.00)	
Educational attainment	Elementary School	64 (58.71)	53 (50.96)	22 (62.85)	0.76	55 (61.79)	8 (61.53)	0 (0.00)	2 (50.00)	8 (61.53)	28 (47.45)	17 (50.00)	8 (72.72)	14 (60.86)	0.98
	Secondary	6 (5.50)	10 (9.61)	1 (2.85)		6 (6.74)	0 (0.00)	0 (0.00)	0 (0.00)	1 (7.69)	5 (8.47)	5 (14.70)	1 (9.09)	0	
	Professional	1 (0.91)	30 (28.84)	1 (2.85)		1 (1.12)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0	
	None	38 (34.86)	11 (10.57)	11 (31.42)		27 (30.33)	5 (38.46)	2 (100.00)	2 (50.00)	4 (30.76)	26 (44.06)	12 (35.29)	2 (18.18)	9 (39.13)	
History or presence of smoking	Yes	39 (35.77)	45 (43.26)	15 (42.85)	0.42	30 (33.70)	6 (46.15)	0 (0.00)	2 (50.00)	7 (53.84)	25 (42.37)	15 (44.11)	5 (45.45)	9 (39.13)	0.81
	No	70 (64.22)	59 (56.73)	20 (57.14)		59 (66.29)	7 (55.84)	2 (100.00)	2 (50.00)	6 (46.15)	34 (57.62)	19 (55.88)	6 (54.54)	14 (60.86)	
Exposure to indoor air pollution	Yes	101 (92.66)	96 (92.30)	33 (94.28)	0.00	80 (89.88)	13 (100.00)	2 (100.00)	4 (100.00)	12 (92.30)	57 (96.61)	29 (85.29)	11 (100.00)	22 (95.65)	0.68
	No	8 (7.33)	8 (7.69)	2 (5.71)		9 (10.11)	0 (0.00)	0 (0.00)	0 (0.00)	1 (7.69)	2 (3.38)	5 (14.70)	0 (0.00)	1 (4.34)	
Exposure to environmental pollution at work	Yes	76 (70.37)	75 (72.11)	25 (71.42)	0.90	64 (71.91)	9 (69.23)	1 (50.00)	1 (25.00)	9 (69.23)	43 (72.88)	24 (70.58)	8 (72.72)	18 (78.26)	0.70
	No	33 (30.27)	29 (27.88)	10 (28.57)		25 (28.08)	4 (30.76)	1 (50.00)	3 (75.00)	4 (30.76)	16 (27.11)	10 (29.41)	3 (27.27)	5 (21.73)	
History of tuberculosis	Yes	1 (0.91)	5 (4.80)	3 (8.57)	0.14	1 (1.12)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	4 (6.77)	1 (2.94)	2 (18.18)	1 (4.34)	0.39
	No	108 (99.08)	99 (95.19)	32 (91.42)		88 (98.87)	13 (100.00)	2 (100.00)	4 (100.00)	13 (100.00)	55 (93.22)	33 (97.05)	9 (81.81)	22 (95.65)	
History of respiratory infections in childhood	Yes	11 (10.09)	7 (6.73)	4 (11.42)	0.74	8 (8.98)	2 (15.38)	0 (0.00)	0 (0.00)	2 (15.38)	3 (5.08)	3 (8.82)	3 (27.27)	1 (4.34)	0.67
	No	98 (89.90)	97 (93.26)	31 (88.57)		81 (91.01)	11 (84.61)	2 (100.00)	4 (100.00)	11 (84.61)	56 (94.91)	31 (91.17)	8 (72.72)	22 (95.65)	

* Kruskal-Wallis test.

Discussion

The mean age of the participants in the present study was 74.78 years, which is within the age range reported worldwide for COPD patients (62-74 years).[21-31] These findings support the idea that COPD is a disease that mainly affects older people, who are more vulnerable to adverse effects such as severe exacerbations and frequent hospitalizations.[32]

In our study, 52.82% of the participants were male, a figure similar, although slightly lower, to the 57.1% reported by Correa *et al.*[21] in a study conducted in 61 patients with a diagnosis of COPD who attended the internal medicine service of the Hospital Pasteur in Montevideo (Uruguay) between October 1, 2015, and December 31, 2016. However, it is much lower than the one described in studies carried out in Europe and Asia (73.4-91.6%).[22-31] In this regard, according to the analysis of the global burden of COPD carried out in 2022 by Zou *et al.*,[33] the burden of the disease was lower among women, which makes sense in view of the greater affectation of the male sex. Furthermore, the lower proportion of men found in our study and the Uruguayan study, when compared to findings reported in European and Asian studies, could be explained by the demographic characteristics of the population groups.

In the present study, 88.35% of the participants reported having family support. This finding is similar to that described by Godoy-Ramírez *et al.*,[34] who documented that 76.8% of 151 patients with severe or very severe COPD (according to the GOLD classification) treated in Spain lived with an informal primary caregiver. In this respect, studies such as the randomized controlled clinical trial conducted by Marques *et al.*[35] state that family involvement in the rehabilitation plans of COPD patients can significantly improve the course of the disease, promoting greater adherence to treatment and, consequently, a better health-related quality of life.

On the other hand, exposure to indoor air pollution and environmental pollution at work were the most common risk factors (92.73% and 71.04%, respectively). Although information on exposure to these factors is limited, our findings are similar to those reported by Marchetti *et al.*[36] in a multicenter study conducted with data from 9 614 COPD patients treated in 21 health institutions in the United States, in which the prevalence of occupational exposure to pollutants (fume, dust, and uncertain pollutants) was 71.97% (83.3% in men and 59.1% in women). Similarly, Hong *et al.*,[37] in a study of 347 COPD patients treated in 14 hospitals of South Korea, reported that 8.9% of the participants lived or had a history of living near a factory, 53.3% had been exposed for one year or more to smoke from wood used for cooking or heating, and 78.3% had been exposed for one year or more to smoke and other pollutants derived from coal used for cooking or heating.

Notwithstanding the above, Duan *et al.*,[29] in a study of 5 183 COPD patients treated in the outpatient departments of 12 hospitals of southern China (smokers=3 688; nonsmokers=1 495), reported that only 35.25% of patients in the nonsmoking group had been exposed to workplace contamination.

Regarding smoking, only 39.97% of our patients were smokers or former smokers, a figure that differs greatly from that reported in most of the international literature (66.8%-90.8%).[24-26,29-31]

The mMRC scale is a widely used instrument for measuring respiratory distress when performing daily activities;[38] moreover, its simplicity and ease of use make it a valuable instrument in clinical practice. In our study, the most frequent dyspnea severity according to mmRC score was grade 3 (41.13%), followed by grade 4 (21.16%). This finding is partially similar to that described in the study by Kim *et al.*,[39] conducted in 257 outpatients with COPD treated at a university hospital in Korea, in which, although not

the most frequent, grade 3 dyspnea was reported in 31.10%. However, it differs from the reports of the studies by York et al.,[40] conducted in England in 203 people with COPD, and Ouaalaya et al.,[41] conducted in 1 973 patients treated in several hospitals of southern France, where 31.5%, 27.6% and 19.7% and 37.77%, 28.94% and 51.54% of the patients had dyspnea grade 2, 4 and 3, and 2, 1 and 3, respectively.

As for the impact of COPD on patients' lives, in our study the mean CAT score was 22.6±12.82, which means a low impact. However, this figure is higher than that reported in multiple studies conducted in Switzerland (13.3±7.2),[42] Spain (M: 20.8±9, F: 21.2±8.7;[24] 18,9±7,3[43]), Japan (COPD patients with pulmonary arterial hypertension: 16.0; COPD patients without pulmonary arterial hypertension: 11.0),[28] China (smokers: 16.2±6.4; non-smokers: 15.7±6.5),[29] Singapore (10 [IQR: 6-16]),[31] and South Korea (15.7±9.3).[39]

In the present study, COPD severity was assessed based on the GOLD 2022 and ALAT 2019 criteria. In the case of the GOLD criteria, grades 1 and 2 were the most frequent (43.55% and 42.74%, respectively). Concerning the classification of the disease according to the GOLD criteria, the evidence at the international level is heterogeneous, which can be explained, first, by the fact that the available studies use different versions of this guideline and, second, by the demographic differences between the populations. For example, in Uruguay, Correa et al.[21] (GOLD 2017) reported that grades 2 (38.1%) and 3 (35.7%) were the most frequent; in Spain, García-García et al.[22] (GOLD 2011) and Montserrat-Capdevila et al.[24] (GOLD 2018) found that grades A (43.8%) and C (21.6%) and grades 2 (49.1%) and 3-4 (38.5%) were more common; in Italy, Radovanovic et al.[23] (GOLD 2017) indicated that grades D (39.1%) and B (30.7%) were the most frequent; in Greece, Tsiligianni et al.[26] (GOLD 2018) identified grades B (34.3%) and D (28.5%) as the most frequent; in Japan, Tsutsumi et al.[27] (GOLD 2019) and Nakayama et al.[28] (GOLD 2017) stated that grades 2 (47% and 45.9%) and 1 (30.8% and 30.6%) were the most common; in Singapore, Sim et al.[31] (GOLD 2021) stated that grades 2 (49.3%) and 1 (26.3%) were the most frequent; in England, Yorke et al.[40] (GOLD 2011) reported that grades 3 (41.7%) and 2 (26.43%) were the most frequent; in Switzerland, Zogg et al.[42] (GOLD 2011) noted that grades 2 (57.87%) and 1 (26.43%) were the most common; in China, Cui et al.[44] (GOLD 2017) found that grades D (48.4%) and B (44.8%) were the most frequent; and finally, in Venezuela, according to Santeliz[45] (GOLD 2019), grades A (29.2%) and D (26.9%) were the most common.

In the case of ALAT criteria, mild and moderate classifications were the most frequent (43.95% and 41.93%, respectively). Unfortunately, the literature on the use of these criteria for the classification of COPD severity is limited, as we only found one study by Montes de Oca et al.[46] in 1 429 patients attended in primary care centers of 4 Latin American countries (Argentina, Colombia, Venezuela, and Uruguay), in which it was reported that COPD was classified as moderate, severe, and mild in 45.4%, 23.7%, and 13.8% of the 282 patients diagnosed with this disease according to these criteria.

Lastly, it was observed that the distribution of patients in disease severity categories was similar between both guidelines, as more than 90% of patients with mild, moderate and severe COPD (ALAT criteria) were classified as COPD GOLD1, GOLD 2, and GOLD 3, respectively. This similarity could suggest that both GOLD 2022 and ALAT 2019 criteria can be used interchangeably to assess the severity of this condition in Colombian patients effectively, thus facilitating appropriate treatment.

However, further studies, preferably multicenter and with larger or national samples, are required to confirm these findings, as our results differ from those reported in the work of Montes de Oca et al.[46] In that study, although 100% of patients classified with mild COPD according to ALAT criteria were assigned to group GOLD A (equivalent to

GOLD 1), significant differences were observed in the other categories: 73% of patients with moderate COPD were assigned to group GOLD A and only 23% to group GOLD B (equivalent to moderate), while in the case of patients with severe COPD, 33%, 30%, and 38% were assigned to groups B, C, and D, respectively. The discrepancy between our findings and those of Montes de Oca *et al.*[46] could be related to the fact that in both studies two different versions of both criteria are used (2019 and 2022 vs. 2017 or earlier and 2013) and that it is likely that the more recent versions of these criteria have more aspects in common. Consequently, it is important to carry out more studies in Latin America with larger and more representative samples comparing the use of both guidelines.

Regarding the limitations of the present study, it should be noted that, due to the nature of the population and the data analyzed, access to certain population groups was limited. Moreover, equitable coverage of all municipalities was not achieved, which may have affected the diversity of the sample. Finally, the lack of patient follow-up prevents us from assessing the evolution and long-term outcomes of their disease. Despite this, the results described here demonstrate the applicability of the ALAT 2019 or GOLD 2022 guidelines for the assessment of COPD severity in Colombian patients. We recommend following the recommendations established by these guidelines for follow-up in future studies, as well as including a control group, as this would allow for a better understanding of disease progression and response to treatment in local populations.

Conclusions

Based on the results of the present study, it may be concluded that COPD severity can be classified indistinctly with the ALAT 2019 or GOLD 2022 criteria, since the distribution of patients according to disease severity was similar in both guidelines (mild, moderate, severe vs. GOLD-1, GOLD-2, GOLD-3 and GOLD-4), with mild COPD-GOLD-1 being the most frequent classification in our sample, followed by moderate COPD-GOLD-2.

Knowing that any of these instruments can adequately classify COPD severity is extremely important because, once this disease has been diagnosed, its timely and appropriate classification is essential to optimize both the treatment and follow-up of patients, thus improving their quality of life and prognosis. Notwithstanding the above, and given the scarce literature on the subject, further studies comparing the use of both sets of criteria in larger samples, preferably with national representativeness, are required to confirm these results.

Conflicts of interest

None stated by the authors.

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