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Assessment of health status and its correlation with lung function in patients with chronic obstructive pulmonary disease: a study from a tertiary care center in north India

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Abstract

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2023 recommends a comprehensive multidimensional assessment for patients with chronic obstructive pulmonary disease (COPD) and stresses the need for evaluation of their health status and quality of life (QOL). The COPD assessment test (CAT), clinical COPD questionnaire (CCQ), and St. George respiratory questionnaire (SGRQ) are recommended by GOLD for such assessments. However, their correlation with spirometry in the Indian population is not known. Other similar questionnaires like the COPD and sleep impact scale (CASIS), functional performance inventory-short form (FPI-SF), and COPD and asthma fatigue scale (CAFS), though used internationally as a research tool, are still in the offspring stage and have never been used in India. A cross-sectional study was hence conducted in the Department of Pulmonary Medicine, Government Medical College, Patiala, Punjab, India, on 100 COPD patients. Patients were assessed for health status and QOL by CAT, CCQ, SGRQ, CASIS, FPI-SF, and CAFS. The relationship between these questionnaires and airflow limitations was investigated. The majority of the patients were males (n=97), >50 years of age (n=83), illiterate (n=72), had moderate/severe COPD, and belonged to group B (n=66). The mean value of forced expiratory volume in one second (FeV_1) decreased with a deterioration in CAT and CCQ score grouping ($p<0.001$). Patients with poorer CAT and CCQ scores belonged to higher GOLD grades ($k=0.33$, $p<0.001$). The correlation of health-related quality of life (HRQL) questionnaires among each other, with FEV_1 predicted and with GOLD grade, was strong to very strong in most of the comparisons ($p<0.01$ in the majority). On comparison of GOLD grade with mean scores of HRQL questionnaires, it was seen that with the increase in GOLD grading from 1 to 4, the mean values of CAT, CCQ, SGRQ, CASIS, FPI-SF, and CAFS also deteriorated ($p<0.001$, $p<0.001$, $p<0.001$, $p<0.005$, $p<0.001$ and $p<0.001$, respectively). Various easy-to-use HRQL scores should be routinely used in outpatient departments for a comprehensive assessment of COPD patients. These questionnaires, in combination with clinical features, can help in providing a rough estimate of the severity of the disease in places where lung function assessments are not readily available.

Introduction

In the past, assessment and treatment of chronic obstructive pulmonary disease (COPD) were based solely on spirometry. However, with a better understanding of the disease, its hetero-

geneity, and the availability of individualized therapy for patients with COPD, the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2023 recommends a novel comprehensive multidimensional assessment that includes health status and the annual number of exacerbations in addition to lung function [1]. Health status assessment is done by the COPD assessment test (CAT) and COPD questionnaire (CCQ) [1-3]. The use of CAT as an assessment tool under GOLD recommendations is a giant leap, highlighting the fact that the impact of COPD on patients' overall well-being needs to be considered [1].

Evidence from population studies with a focus on a comprehensive evaluation of COPD shows that quality of life (QOL) questionnaires provide valid estimates of disturbances in daily lifestyle [4-6]. However, these questionnaires are more focused on patient-perceived health impairments and may or may not correlate with airway obstruction [4-6]. Though the CAT, CCQ, and St. George respiratory questionnaire (SGRQ) have been recommended by GOLD 2023 for COPD assessment, they have rarely been compared head-to-head with each other. This comparison needs to be investigated, as CCQ seems to have a detailed assessment of physical and mental activities when compared to CAT [3].

Globally, the COPD and sleep impact scale (CASIS), functional performance inventory-short form (FPI-SF), and COPD and asthma fatigue scale (CAFS) have also been used for the assessment of health status and QOL in COPD patients [7-11]. However, in the Indian population, questionnaires like CASIS, FPI-SF, and CAFS have never been used for COPD patients. The results of these questionnaires seem promising; however, they seem to be more focused on the evaluation of a specific aspect of the disease spectrum, and their correlation with airway obstruction and among each other is not known [9-11]. There is thus an urgent need to develop and validate QOL questionnaires for COPD patients and evaluate their relationship with spirometric indices.

Our study, therefore, aimed to evaluate the health status and QOL of COPD patients by using these questionnaires (CAT, CCQ, SGRQ, CASIS, FPI-SF, and CAFS) and understand their relationship with airflow limitation and with each other.

Materials and Methods

Study design and setting

A cross-sectional study was conducted in the Department of Pulmonary Medicine, Government Medical College, Patiala, Punjab, India, from April 2020 to August 2021. The study was approved by the institute's Ethics Committee.

Sample

After informed consent was obtained, a total of 100 COPD patients were enrolled. COPD was diagnosed as per the diagnostic criteria of the GOLD 2020 [12].

Exclusion criteria

Patients <18 years of age who refused to give consent, those with acute exacerbations of COPD, who were critically ill or had co-morbidities like tuberculosis, carcinoma lung, diffuse parenchymal lung disease, severe renal/cardiac disease, *etc*., pregnancy/lactation, and those unable to perform spirometry or incompetent to fill questionnaires were excluded from the study.

Assessment and data collection

Spirometry was used for the diagnosis and classification of COPD as per GOLD 2020 guidelines [12]. Patients were classified as GOLD 1, GOLD 2, GOLD 3, and GOLD 4. A detailed physical examination and evaluation were done. Relevant socio-demographic details were also noted as per the specially constructed structured proforma.

Patients were assessed for health status and QOL by CAT, CCQ, SGRQ, CASIS, FPI-SF, and CAFS questionnaires (*Supplementary Annexure*), as detailed below.

Chronic obstructive pulmonary disease assessment test

The CAT consists of eight items that reflect the most bothersome health-related symptoms. The scale in total ranges from 0 to 40, with higher scores indicating a poor perception of disease-related health status [2]. Additionally, the scores were also classified into four categories: low (0-10), medium (11-20), high (21-30), and very high (31-40) [13].

Clinical chronic obstructive pulmonary disease questionnaire

The CCQ is composed of ten items distributed in three domains (symptoms, functional, and mental state) assessed by a 7-point scale from 0 to 6, with a higher score indicating poor health status [3]. The total score is calculated by summing the scores of the questions applied and dividing it by the number of questions. Additionally, the scores were also classified into four categories: acceptable (<1), moderate (1≤CCQ<2), severe (2≤CCQ<3), and very severe (≥3) [13].

St. George respiratory questionnaire

The SGRQ has 50 items distributed into three categories: symptoms, activity, and impact, with 76 weighted responses. The lowest possible weight is 0, and the highest is 100. Each item has an empirically derived weight, and a total score is calculated [7].

Chronic obstructive pulmonary disease and sleep impact scale

The CASIS is a 7-item score on sleep impairment that ranges from 1 (never) to 5 (very often). The item scores are summed together to arrive at a total raw score, which is then transformed linearly to a 0-100 total scale score [9].

Functional performance inventory-short form

The FPI-SF is a 32-item self-administered questionnaire to assess the level of difficulty respondents have with physical activities across six domains. The scores are given as "no difficulty" (score 3), "some difficulty" (score 2), and "much difficulty" (score 1). The total score is the mean score across the six domains [10].

Chronic obstructive pulmonary disease and asthma fatigue scale

The 12-item CAFS incorporates items on fatigue associated with respiratory disease and breathing problems. The response options go from 1 (never) to 5 (very often). The raw scores are then linearly transformed to a 0-100 total scale score [11].

Statistical analysis

Discrete categorical data were represented in the form of either a number or a percentage (%). The normality of quantitative data was checked by the Kolmogorov-Smirnov tests of normality. Continuous data, assumed to be normally distributed, were written in the form of their mean and standard deviation. For skewed data, the median and interquartile range were taken. CASIS and CAFS were transformed on the Likert scale, on a 0-100 scale [9,11].

Proportions were compared using the Chi square or Fisher's exact test, depending on their applicability. To see agreement between COPD grading, ABCD grouping, CAT, and CCQ stratified, the k test of agreement was applied. For normally distributed data, means of different parameters were taken. For skewed data, the Kruskal-Wallis test, followed by the Mann-Whitney test, was applied. The Spearman correlation coefficient (rho) was calculated to see the relation of quantitative variables of spirometric findings with various health-related quality of life (HRQL) questionnaires.

All the statistical tests were 2-sided and were performed at a significance level of α=0.05. Analysis was conducted using IBM SPSS Statistics v. 22.0 (IBM Corp., Armonk, NY, USA).

Results

The various socio-demographic variables of the patients are depicted in Table 1. The majority of the patients were males (n=97) and >50 years of age (n=83). The majority of the patients were illiterate (n=72) and diagnosed with moderate/severe COPD as per GOLD grading (n=82). As per ABCD tool classification, the majority of the patients belonged to group B (n=66).

The correlation of CAT and CCQ score groups with forced expiratory volume in one second (%FEV_1 predicted) and GOLD grading is depicted in Table 2. The mean value of %FeV_1 decreased with deterioration in the CAT and CCQ score groups. The majority of the patients with GOLD grades 1 and 2 had low CAT scores (less than 20), whereas patients with GOLD grades 3 and 4 had CAT scores in the high/very high range (more than 20). However, severe and very severe groups, as per CCQ grouping, comprised patients from GOLD grade 2 too, in addition to patients from grades 3 and 4.

The correlation of HRQL questionnaires among each other, with %FEV_1 predicted and with GOLD grade, is depicted in Table 3. The correlation was strong to very strong in most of the relationships ($p<0.01$). FPI-SF had the strongest correlation with %FEV_1 predicted and GOLD grade. CAT had the best correlation with CCQ and SGRQ. CCQ had the best correlation with CAT, followed by FPI-SF and SGRQ. CASIS had the poorest correlation with %FEV_1 predicted among the various HRQL questionnaires used in our study.

The correlation of GOLD grade with the mean scores of HRQL questionnaires is depicted in Table 4. As the GOLD grading increased from 1 to 4, the mean values of CAT, CCQ, SGRQ, CASIS, FPI-SF, and CAFS also deteriorated.

Discussion

It is challenging to use discrete patient-centered assessment tools for the study of different aspects of the disease spectrum in multi-system illnesses like COPD. The correlation of such tools and various HRQL questionnaires with lung function and among themselves is another area where research work is needed. The present study was therefore conducted to evaluate COPD patients with various HRQL questionnaires like CAT, CCQ, SGRQ, CASIS, FPI-SF, and CAFS and understand their relationship with airflow limitation and among themselves.

In our study, the majority of patients were >60 years of age. The observed pathophysiological changes in lung structure associated with aging could be a possible reason. Additionally, an increase in the number of years of smoking with age directly increases the smoking index and hence the likelihood of the development of COPD in later years of life. The majority of the patients were males (97%); our results for gender differences are similar to the available literature [14,15].

Table 1. Demographic data and characteristics of patients.

		Number (%)
Age (in years)	41-50	17(17)
	51-60	35(35)
	>60	48(48)
Gender	Males	97 (97)
	Females	3 (3)
Residential locality	Rural	53 (53)
	Urban	47 (47)
Education level	Illiterate	72 (72)
	Primary	23 (23)
	Secondary	4 (4)
	Graduation and above	1 (1)
Employment status	Agriculture/laborer	44 (44)
	Self employed	33 (33)
	Private job	12 (12)
	Government job	5 (5)
	House maker/unemployed	6 (6)
Comorbidity	No comorbidity	72 (72)
	Cardiovascular	21 (21)
	Diabetes mellitus	3 (3)
	Other/multiple comorbidities	4 (4)
ABCD assessment tool	A	4 (4)
	B	66 (66)
	C	1 (1)
	D	29 (29)
GOLD Grading	GOLD 1	4 (4)
	GOLD 2	43 (43)
	GOLD 3	39 (39)
	GOLD 4	14 (14)
Scales	%FEV_1 predicted	48.05±16.89
	CAT	17.94±5.77
	CCQ	2.30±0.61
	SGRQ	40.45±14.94
	CASIS	19.82±16.55
	FPI-SF	1.24±0.38
	CAFS	27.08±6.61
CAT score groups	0-10	12 (12)
	11-20	48 (48)
	21-30	39 (39)
	31-40	1 (1)
CCQ score groups	Less than 1	3 (3)
	1≤CCQ<2	23 (23)
	2≤CCQ<3	56 (56)
	CCQ≥3	18 (18)

CAT, chronic obstructive pulmonary disease assessment test; CCQ, clinical chronic obstructive pulmonary disease questionnaire; GOLD, Global Initiative for Chronic Obstructive Lung Disease; %FEV_1, forced expiratory volume in one second; SGRQ, St. George respiratory questionnaire; CASIS, chronic obstructive pulmonary disease and sleep impact scale; FPI-SF, functional performance inventory-short form; CAFS, chronic obstructive pulmonary disease and asthma fatigue scale.

Table 2. Correlation between chronic obstructive pulmonary disease assessment test and clinical chronic obstructive pulmonary disease questionnaire score groups *versus* forced expiratory volume in one second in percent of the predicted value, Global Initiative for Chronic Obstructive Lung Disease grading, ABCD assessment tool.

	CAT score groups			
	0-10 CAT (low) Mean±SD	11-20 CAT (medium) Mean±SD	21-30 CAT (high) Mean±SD	31-40 CAT (very high) Mean±SD
%FEV_1 predicted	63.66±14.31	52.77±14.65	38.02±13.99	25.00±0.00
p<0.001				
	CCQ score groups			
	Less than 1 CCQ (acceptable) Mean±SD	1≤CCQ<2 (moderate) Mean±SD	2≤CCQ<3 (severe) Mean±SD	CCQ≥3 (very severe) Mean±SD
%FEV_1 predicted	67.33±11.84	60.69±12.39	46.35±15.76	33.94±11.81
p<0.001				
COPD GOLD Grading	CAT score groups			
	0-10 CAT (low) n (%)	11-20 CAT (medium) n (%)	21-30 CAT (high) n (%)	31-40 CAT (very high) n (%)
1 (n=4)	3 (75)	0 (0.0)	1 (25)	0 (0.0)
2 (n=43)	8 (18.6)	31 (72.1)	4 (9.3)	0 (0.0)
3 (n=39)	1 (2.6)	15 (38.5)	23 (59.0)	0 (0.0)
4 (n=14)	0 (0.0)	2 (14.3)	11 (78.6)	1 (7.1)
k=0.33, p<0.001				
	CCQ score groups			
	Less than 1 CCQ (acceptable) n (%)	1≤CCQ<2 (moderate) n (%)	2≤CCQ<3 (severe) n (%)	CCQ≥3 (very severe) n (%)
1 (n=4)	1 (25.0)	2 (50.0)	1 (25)	0 (0.0)
2 (n=43)	2 (4.7)	19 (44.2)	21 (48.8)	1 (2.3)
3 (n=39)	0 (0.0)	2 (5.1)	28 (71.8)	9 (23.1)
4 (n=14)	0 (0.0)	0 (0.0)	6 (42.9)	8 (57.1)
k=0.33, p<0.001				

CAT, chronic obstructive pulmonary disease assessment test; SD, standard deviation; %FEV_1, forced expiratory volume in one second in percent of the predicted value; CCQ, clinical chronic obstructive pulmonary disease questionnaire; COPD, chronic obstructive pulmonary disease; GOLD, Global Initiative for Chronic Obstructive Lung Disease.

Table 3. Correlation between various health-related quality of life questionnaires. Correlation is in terms of the Spearman correlation coefficient (rho).

HRQL questionnaires	%FEV_1 predicted	CAT	CCQ	SGRQ	CASIS	FPI-SF	CAFS
%FEV_1 predicted	1.000	-0.625**	-0.563**	-0.569**	-0.273**	0.669**	-0.627**
CAT	-0.625**	1.00	0.855**	0.792**	0.649**	-0.867**	0.64**
CCQ	-0.563**	0.855**	1.000	0.760**	0.558**	-0.816**	0.63**
SGRQ	-0.569**	0.792**	0.760**	1.000	0.508**	-0.768**	0.58**
CASIS	-0.273**	0.649**	0.558**	0.508**	1.000	-0.529**	0.47**
FPI-SF	0.669**	-0.867**	-0.816**	-0.768**	-0.529**	1.00	-0.689**
CAFS	-0.627**	0.647**	0.633**	0.588**	0.475**	-0.689**	1.00
COPD GOLD grade	-0.926**	0.680**	0.634**	0.631**	0.334**	-0.707**	0.629**

HRQL, health-related quality of life; %FEV_1 predicted: forced expiratory volume in one second in percent of the predicted value; CAT, chronic obstructive pulmonary disease assessment test; CCQ, clinical chronic obstructive pulmonary disease questionnaire; SGRQ, St. George respiratory questionnaire; CASIS, chronic obstructive pulmonary disease and sleep impact scale; FPI-SF, functional performance inventory-short form; CAFS, chronic obstructive pulmonary disease and asthma fatigue scale; COPD, chronic obstructive pulmonary disease; GOLD, Global Initiative for Chronic Obstructive Lung Disease; **correlation is significant with p<0.01.

Table 4. Correlation between various health-related quality of life questionnaires and Global Initiative Obstructive Lung Disease grading.

HRQL questionnaires	COPD GOLD grading GOLD grade 1 (mild) (n=4)	GOLD grade 2 (moderate) (n=43)	GOLD grade 3 (severe) (n=39)	GOLD grade 4 (very severe) (n=14)	p value
CAT	10.25±8.53	14.41±4.20	20.41±3.95	24.07±4.02	<0.001
CCQ	1.47±0.97	1.97±0.47	2.51±0.43	2.97± 0.40	<0.001
SGRQ	19.77±14.38	32.12±11.93	47.61±12.16	52.01±10.12	<0.001
CASIS	1.78±2.06	15.86±14.07	22.06±17.81	30.86±14.79	<0.005
FPI-SF	1.90±0.67	1.47±0.28	1.05±0.22	0.87±0.16	<0.001
CAFS	14.06±3.55	24.03±7.25	36.00±12.93	46.27±14.55	<0.001

COPD, chronic obstructive pulmonary disease; GOLD, Global Initiative for Chronic Obstructive Lung Disease; HRQL, health-related quality of life; CAT, chronic obstructive pulmonary disease assessment test; CCQ, clinical chronic obstructive pulmonary disease questionnaire; SGRQ, St. George respiratory questionnaire; CASIS, chronic obstructive pulmonary disease and sleep impact scale; FPI-SF, functional performance inventory-short form; CAFS, chronic obstructive pulmonary disease and asthma fatigue scale.

The majority of our study population belonged to a rural background, possibly because more people were smoking, had increased exposure to second-hand smoke, and had less access to smoking cessation programs when compared to people living in urban areas. Rural residents are also more likely to have higher poverty levels and less formal education, which may lead to less access to early diagnosis and treatment [16]. Education inequality is an important factor affecting the smoking status of an individual throughout a lifetime, with the less educated being at a greater risk of smoking. The majority of our COPD patients were either illiterate or less educated. A disproportionate burden of COPD thus occurs due to differences in health behaviors and socio-economic and political factors. Patiala is a semi-urban city, with a mixed population of patients presenting to our tertiary care center, which could be the reason for such findings. Our results were consistent with previous studies [16-20].

As per the GOLD classification, the majority of the patients were in GOLD grades 2 (moderate) and 3 (severe). Since ours is a tertiary care referral hospital, most of the patients do not report at the first presentation of clinical symptoms or during exacerbations to our hospital and may be seeking treatment at the local level on an irregular basis. By the time they are diagnosed, they already have poor lung function [13,15].

The GOLD ABCD assessment tool classified the majority of our patients (66) into groups B and D. Most of the patients had a modified Medical Research Council dyspnea scale grade >2 breathlessness and CAT >10, thereby placing them in groups B or D. A reliable history/documentation of annual exacerbations in the past year was not available. The majority of the mild exacerbations are ignored, or they do not bring patients to the hospital, as these are taken as part of their routine and are treated at the local level.

On studying the relationship of different questionnaires with $\%FEV_1$ predicted, it was seen that CAT and CCQ scores correlated well with $\%FEV_1$ predicted and deteriorated with the deterioration in lung function as seen in the studies in the past [13,15,21]. This is an important finding, and we propose that these easy-to-find patient-friendly tools, in combination with clinical features, can provide a rough estimate of the severity of COPD and help in measuring therapeutic responses at follow-ups at centers where lung function assessments are not readily available or feasible because of a lack of resources or time constraints.

CAT correlated very strongly with CCQ ($r=0.855$, $p<0.01$), as seen in the past [13,22]. However, in the CCQ subgroup classification, 74% of the patients had severe or very severe disease (CCQ≥2), whereas only 40% of patients were in high-very high CAT (CAT≥21). Thus, CCQ classified some of our patients into more severe categories as compared to CAT. Similar results are available from the past [10]. However, we could not confirm whether CCQ was overestimating or CAT was underestimating the severity of illness in our COPD patients. The difference could be because of the obvious differences between the two instruments. CAT has no corresponding mental domain. CCQ has a mental domain, and an assessment of mental well-being in patients with COPD could explain the poorer scores of our patients. We propose that poorer scores on the CCQ are an early indication of psychological distress. A detailed mental health assessment should be an integral part of comprehensive management strategies for COPD.

In our study, the CAT score strongly correlated with GOLD grading ($rho=0.680$, $p<0.01$). The majority of patients with a CAT score of 0-10 were in GOLD grade 1 or 2. The majority of patients with a CAT score of 21-30 were in GOLD grade 3 or 4. There was no patient with a CAT score of 0-10 in grade 4. As the COPD severity grade increased, there was a subsequent increase in CAT scores. Patients with higher CAT scores had poorer lung function.

In our study, GOLD COPD grading also correlated strongly with CCQ ($rho=0.634$, $p<0.01$). It was observed that GOLD grades 3 and 4 had 96.22% (n=51/53) of the patients with a >2 CCQ score (severe-very severe), whereas the majority of the patients (75%, n=3/4) in grade 1 had a CCQ score of <2 (acceptable-moderate). CCQ scores could thus efficiently discriminate between groups of patients who differ in COPD severity [13, 23]. This correlation of CAT and CCQ with GOLD grading further justifies our proposal for using these handy tools as a quick estimate of patients' disease status in settings with minimal resources and time constraints.

When the correlation of $\%FEV_1$ predicted with various HRQL questionnaires was studied, it was observed that $\%FEV_1$ predicted correlated strongly to very strongly with CAT, CCQ, SGRQ, FPI-SF, and CAFS but weakly with CASIS. $\%FEV_1$ predicted correlated best with FPI-SF, and our results are similar to the available literature [24]. FPI-SF has diverse domains that cover almost all aspects of daily routine, which explains the strongest correlation with $\%FEV_1$ predicted. The only disadvantage with FPI-SF is that it is a lengthy tool and takes a lot of time to complete when administered. On the other hand, the weak correlation between $\%FEV_1$ predicted and CASIS can be explained by the lack of interest, ignorance, and casual approach of the people of this part of the world towards the quality of sleep, as CASIS is a sleep-based questionnaire. Global data also suggests that little is known about the association of quality of sleep with the severity of COPD, even though the quality of sleep affects HRQL and is an important predictor of mortality [25]. The importance of sleep for COPD patients has recently been strongly considered by GOLD. A question on sound sleep has been incorporated as one of the eight questions of CAT scoring. Our results also propose the need for investigation of this ignored domain of sleep in COPD patients.

It has been seen in the past that, in addition to actual limitations, lung function measurement depends on multiple factors like the effort of the patient, the expertise of the technician in explaining the procedure, *etc*., and is thus very subjective [13,26]. Comprehensive questionnaires can thus provide additional information while assessing the patients in totality.

On studying the correlation of various questionnaires among each other, it was seen that, similar to the available literature, CAT correlated very strongly with CCQ, SGRQ, and FPI-SF scores (rho=0.85, 0.79, 0.86, respectively) and strongly with CASIS and CAFS (rho=0.64, 0.64, respectively) [13,15]. CCQ correlated very strongly (rho=-0.81) with FPI-SF and strongly (rho=0.63) with CAFS. The correlations between CCQ and SGRQ also came out to be very strong (rho=0.76), as in the past [2,15,27]. Such correlations suggest that short and easy questionnaires such as CAT and CCQ are likely to offer relevant alternatives to complex tools such as SGRQ, providing primary care providers with comprehensive and objective but non-time-consuming assessments. Another strong correlation of CAFS with FPI-SF (rho=-0.68), as seen in our study, shows that fatigue and functional performance affect each other greatly. It has been documented in the literature too [28].

When the mean scores of CAT, CCQ, SGRQ, CASIS, FPI-SF, and CAFS were studied in relation to GOLD grades, it was seen that the mean scores became poorer with increasing GOLD grading ($p<0.01$). Our results are similar to those in the available lit-

erature [13]. A study from the Indian subcontinent, which used SGRQ as the assessment tool, also showed that SGRQ scores correlated with GOLD grading [5].

Our results thus recommend that simple, easy, and brief HRQL questionnaires can be of great help in evaluating COPD patients in our routine clinics and can give us an idea of the underlying severity of the illness as well. Hence, their regular use should be recommended.

Limitations

This was a cross-sectional study at a single medical center without any follow-up. It is postulated that HRQL indicators may show improvement with quitting smoking, pulmonary rehabilitation programs, and attaining a stable phase of treatment. *Vice versa*, they may deteriorate with the onset of exacerbations. However, such a follow-up assessment was not done. The presence of comorbidity in our study does not reflect the true burden of comorbidities in COPD because we did not use any discrete method for diagnosing the same.

Conclusions

Our study endorses the GOLD 2023 recommendations: different health-related questionnaires should be used as a handy tool in our busy outpatient departments. They help us provide an estimate of the severity of COPD and are easy to administer and fast to complete. However, since the majority of the questionnaires assess a particular domain of the disease, there is an urgent need to devise COPD-specific comprehensive and detailed questionnaires that cover the neglected aspects of the disease spectrum.

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Online supplementary material:
Supplementary Annexure. Questionnaires.