Original Article

Health-Related Quality of Life of Chronic Obstructive Pulmonary Disease Patients

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is a common health problem, characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities. COPD is usually caused by significant exposure to noxious particles or gases. **Objective:** The objective was to assess the impact of COPD on health-related quality of life (HRQOL) of COPD patients. **Materials and Methods:** In this cross-sectional descriptive study, sixty stable COPD patients without significant comorbidity, not in acute severe exacerbation, who were assessed for HRQOL were interviewed at the Chest Consultant Clinic of Baghdad Teaching Hospital by using 14 questions of Centers for Disease Control and Prevention HRQOL Questionnaire between May 2017 and February 2018. **Results:** Of the sixty participants (80% male and 20% female), all of them were cigarettes smokers (current 57%, ex– smoker 43%)" mean ± standard deviation (SD) of age 57.4 ± 10.9 years, mean ± SD of their tobacco smoking pack years 61.0 ± 28.7. About 62% of them said that their general health is poor with COPD and 95% of them said they were limited in any way in their activities from the disease. Eighty-five percent of them said that they didn't get enough rest or sleep in the last 30 days due to their illness. Seventy-five percent 75% of them said that shortness of breath due to COPD made it hard to do usual activities in the last month. They needed help for personal care and help for routine needs in life as their answers to questionnaire questions revealed. Statically significant results ($P < 0.05$) also revealed that the higher COPD severity stage, the lower HRQOL. **Conclusions:** HRQOL of COPD patients is considerably impacted by this disease and the impaction differs according to the severity stage of COPD, the higher the severity of COPD, the lower the quality of life. As the goal of therapy in COPD is to improve symptoms and quality of life, so assessment of HRQOL is mandatory in all COPD patients and it is important part of disease management and follow-up. It is necessary to increase public awareness about tobacco smoking harms because of their direct effect on developing and severity of COPD.

Keywords: Chronic obstructive pulmonary disease, health-related quality of life, tobacco smoking

Introduction

Chronic obstructive pulmonary disease (COPD) is a preventable disease characterized by persistent airflow limitation that is usually progressive, and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases such as carbon monoxide, hydrocarbons, oxygenated and chlorinated organics, and free radicals. Pathophysiologically, COPD is defined by the presence of irreversible airflow obstruction with hyperinflation and impaired gas exchange.

The prevalence of COPD is directly related to the prevalence of tobacco smoking and in low- and middle income countries, the use of biomass fuels.

Current estimates suggest that 80 million people worldwide suffer from moderate-to-severe disease. In 2005, COPD contributed to more than 3 million deaths (5% of deaths globally), but, by 2020, it is forecast to represent the third most important cause of death worldwide.[1]

The anticipated rise in morbidity and mortality from COPD will be greatest in Asian and African countries, as a result of their increasing tobacco consumption.

The incidence of COPD is increasing in women as well as men due to increase in active or passive smoking, use of biomass

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fuels in poorly ventilated areas for heat and cooking, in addition to occupational exposures.

Cigarette smoking represents the most significant risk factor, and the risk of developing COPD relates to both the amount and the duration of smoking. People who smoke have a greater annual decline in forced expiratory volume (FEV) 1.

Worldwide, there are approximately 1 billion smokers, and it is estimated by the WHO that 6 million die prematurely each year as a result of their habit. Moreover, there is increasing evidence that passive (or "secondhand") smoking has adverse effects on cardiovascular and respiratory health.

Many millions of patients are thought to be exhibiting early symptoms of COPD but have not yet been diagnosed or treated.

COPD is the term used to refer to patients with airflow obstruction due to emphysema, chronic bronchitis, or a combination of both disorders.

A genetically inherited form of emphysema can occur, resulting from $\alpha 1$ antitrypsin deficiency.

COPD patients commonly present in the fifth decade of life with productive cough, usually worse in the morning; dyspnea, which is the most significant symptom, and it is progressive with time; and wheezing may occur in some patients, particularly during exertion and exacerbations.

No single mechanism can account for the complex pathology of COPD. It is likely that interactions among different mechanisms are involved.[2]

With disease progression, intervals between acute exacerbations become shorter; cyanosis and right heart failure may occur.

Anorexia and weight loss often develop and suggest a worse prognosis.

COPD exacerbation defined as marked increase in dyspnea, an increase in sputum production and change in sputum color commonly occurs due to viral, bacterial infections or environmental changes.

The degree of exacerbation is considered mild when a change in the clinical condition is noted but no change in medication is necessary. It is considered moderate when medication changes are made and severe exacerbation when mostly results in hospitalization (20% of exacerbation cases).

Unfortunately, there is no medical therapy that alters mortality or definitively decreases the rate of decline in lung function in COPD with the exception of smoking cessation, oxygen for chronic hypoxemia, and lung volume reduction in a small subset of highly selected patients.

Therefore, the goal of therapy in COPD is to improve symptoms and quality of life.

In future, the characterization and assessment of COPD will require the consideration of other domains as recently (COPD control panel) that combines severity, activity, and impact modules has been proposed as a potential way forward.[3]

For symptomatic relief, inhaled bronchodilators are mainstay treatment.

Pulmonary rehabilitation is recommended for all symptomatic patients with FEV1 <50% of predicted and also considered in symptomatic or exercise-limited patients with FEV1 ≥50%.

It includes education, functional assessment, nutrition counseling, and follow-up and also includes an exercise training component.

It is very important to enhance health-related quality of life (HRQOL).

Pulmonary rehabilitation improves symptoms, quality of life, and physical and emotional participation in day-to-day activities.

Long-term oxygen therapy (15 h/day) also improves HRQOL of advanced COPD patients (FEV1 below 35% of predicted, rest SpO_2 <88%, rest PaO_2 ≤55 mmHg) with symptoms suggestive of respiratory or right-sided heart failure.

The aim of this study was to assess the impact of COPD on HRQOL of COPD patients and to know the impact of COPD severity stages on HRQOL of COPD patients.

Materials and Methods

Study design and setting

In this cross-sectional study, COPD patients who visited the Chest Consultant Clinic at Baghdad Teaching Hospital during the period of data collection were interviewed using a Centers for Disease Control and Prevention (CDC) HRQOL questionnaire to assess their HRQOL.

Period of study and inclusion and exclusion criteria

Interviews were conducted from May 2017 to February 2018.

Inclusion criteria included all COPD patients who had a documented diagnosis previously by a consultant respiratory physician at Baghdad Teaching Hospital who were seen at the period of data collection.

Exclusion criteria included COPD patients having other significant comorbid disease (chronic liver or kidney disease, cancer, diabetes mellitus, chronic heart disease) or in acute severe COPD exacerbations as well as COPD patients who refused to participate.

Tools of data collection

The data of this study obtained through direct interview with patients using CDC structured questionnaire for assessing HRQOL [Annex 1] consisted of 14 questions in three modules, namely Healthy Days Core module (4 questions), Activity Limitation Module (5 questions), and Healthy Days Symptoms Module (5 questions); each question had multiple options to answer and the patient must choose one option and the answer should be according to the past 30 days (before the interview) time period.

Personal information about COPD patients including gender, age, and education, marital status, occupation, type of residence, date of COPD diagnosis, any COPD treatment in the past 30 days, and smoking history (current smoker, ex-smoker, or nonsmoker) were obtained from each patient, and pack years were calculated for each smoker ones (1 pack year = 20 cigarettes/day/year).

In order to maintain consistency in the use of various terms while gathering data on smoking behavior, the US CDC have developed and updated the following definitions:

- Current smokers: Adults who have smoked 100 cigarettes in their lifetime or more and currently smoke cigarettes every day (daily) or some days (nondaily)
- Nonsmokers: Adults who currently do not smoke cigarettes, who have never smoked a cigarette, or who smoked fewer than 100 cigarettes in their entire lifetime (and currently not smoke)
- Ex-smokers: Ex-smokers were defined as adults who had ceased smoking at least 12 months prior to the interview (who smoke 100 or more cigar in his\her life).

A new spirometry was done on each patient to evaluate and classify him/her according to GOLD guidelines of COPD severity as follows:

- Stage 1 (mild): Postbronchodilator FEV1/forced vital capacity <0.7 and FEV1 of 80% predicted or greater
- Stage 2 (moderate): Postbronchodilator FEV1/FVC <0.7 and FEV1 of 50% predicted or greater but <80% predicted
- Stage 3 (severe): Postbronchodilator FEV1/FVC <0.7 and FEV1 of 30% predicted or greater but <50% predicted
- Stage 4 (very severe): Postbronchodilator FEV1/FVC <0.7 and FEV1of <30% predicted.

Table 1: MRC dyspnea scale

1. Not troubled by breathlessness except on strenuous exercise
2. Short of breath when hurrying or walking up a slight hill
3. Walk slower than contemporaries on level ground because of breathlessness or has to stop for breath when walking at own pace
4. Stops for breath after walking about 100 m or after a few minutes on level ground
5. Too breathless to leave the house or breathless when dressing or undressing

Because 75% of study patients answered that SOB made it hard for them to do usual activities [Figure 1] all patients scored according MRC dyspnea scale to know their degree of SOB accurately as shown in Table 1

Statistical analysis

Data were first entered in an excel file and then transported later into Statistical Package for Social Sciences file version 24 (SPSS, IBM Company, Chicago, IL, USA) for data analysis. Continuous variables were presented as means and standard deviation (SD) and discrete variables were presented as numbers and percentages. Chi-square test for independence was used to test the significance of association between discrete variables. *T*-test for two independent variables and ANOVA test were used to test the significance of difference in means between independent samples. Pearson's correlation coefficient was used to test the significance of correlations and their direction (direct or inverse) between continuous variables. Level of significance was set at $P \leq 0.05$.

Ethical consideration

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with patients' verbal and analytical approval before sample was taken. The study protocol and the subject information and consent form were reviewed and approved by a local ethics committee.

Results

Out of sixty participants (80% male and 20% female), all of them were cigarette smokers (current 57%, ex–smoker 43%). Nearly 62% of them said that their general health is poor with COPD and 95% of them said that they were limited in any way in their activities from the disease. Statistically significant results ($P < 0.05$) revealed that the higher the COPD severity

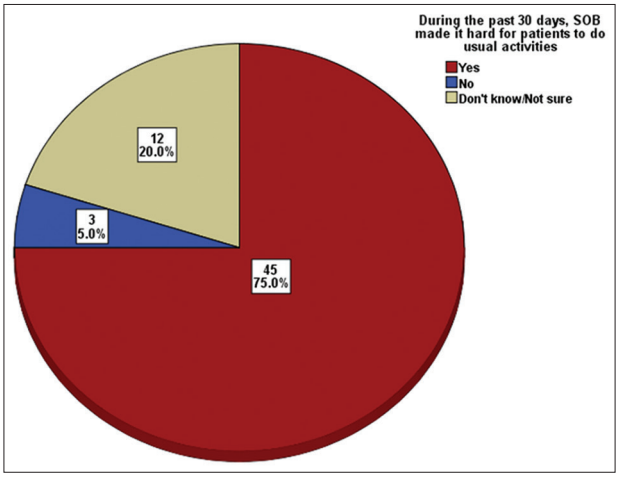

Figure 1: Distribution of sampled patients according to ability to do usual activities in the last 30 days

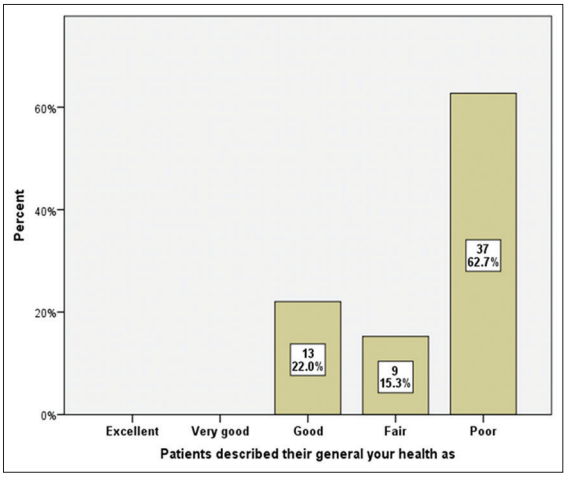

Figure 2: Distribution of sampled patients according to their estimation for the status of general health with chronic obstructive pulmonary disease

stage, the lower the HRQOL. Results in details are shown in Tables 2-8 according to Modules questions.

Discussion

According to the results, this is the first Iraqi study to deal with this subject. HRQOL has been receiving greater attention as a result of increasing income levels and life expectancy, which has been brought about by advances in medical technology.

Because COPD is highly heterogeneous, it is likely that different components of the disease progress at different rates and require different monitoring approaches to determine the disease development, which is different between patients depending on their clinical phenotype and/or treatment status.

The interaction between disease activity and severity is likely to be a key determinant of the impact of COPD on the patients, which is perceived by the patient and how the disease interferes with his or her activities of daily living.[4]

Sixty patients were interviewed in our study according to its inclusion and exclusion criteria; 80% were males and 20% were females (the mean ± SD of their ages 57.4 ± 10.9).

All of them were cigarette smokers (current smokers 56.7%, ex-smokers 43.3%, and nonsmokers 0.0%). This reflects the effect of smoking in the development of the disease. The mean of pack years of smoking was 61.

There were significant correlations between COPD severity stages and study variables (age, smoking status, monthly income, pack years of smoking, dyspnea score, regularity of treatment, and duration of disease [$P < 0.001$, Table 3].

None of the patients described their health as excellent or very good and best status was good [Figure 2]. There was a significant association between general health status and COPD severity that the mild severity is associated with good general health (80% of mild severity patients are having good health) status and higher severity levels are associated with poor general health status (all cases with very severe disease were having poor general health status [$P < 0.05$, Table 4].

The mean length of days of bad physical health increased significantly with severity level from 0 days in moderate disease to whole the month in severe to very severe disease ($P < 0.05$).

This study found no statistically significant change in days without good mental health with the level of COPD severity ($P > 0.05$).

Activity limitation did not significantly associate with COPD severity, and almost all patients regardless of severity level were having this limitation [$P > 0.05$, Table 5].

Duration of limited activity is significantly associated with the severity of disease (the higher the severity, the longer the period), but this significance could be invalid due to small table cell size [$P < 0.5$, Table 5].

Table 2: Characteristics of sampled patients

Variable	Category	*n*=60; 100.0%
Age (years)	Minimum-maximum, mean±SD	3-77, 57.4±10.9
Sex	Male, *n* (%)	48 (80.0)
	Female, *n* (%)	12 (20.0)
Occupation	Freelance, *n* (%)	15 (25.0)
	Housewife, *n* (%)	10 (16.7)
	Employed, *n* (%)	9 (15.0)
	Unemployed, *n* (%)	15 (25.0)
	Retired, *n* (%)	11 (18.3)
	Student, *n* (%)	0 (0.0)
Monthly income (1000 ID)	>500, *n* (%)	12 (20.0)
	250-500, *n* (%)	6 (10.0)
	<250, *n* (%)	42 (70.0)
Residence	Owned, *n* (%)	32 (53.3)
	Rent, *n* (%)	20 (33.3)
	Others, *n* (%)	8 (13.3)
Education level	Primary, *n* (%)	12 (20.0)
	Secondary, *n* (%)	15 (25.0)
	Higher than secondary, *n* (%)	13 (21.7)
	Not at all, *n* (%)	20 (33.3)
Marital status	Single, *n* (%)	0 (0.0)
	Married, *n* (%)	49 (81.7)
	Others, *n* (%)	11 (18.3)
Smoking status	Current smokers, *n* (%)	34 (56.7)
	Ex-smokers, *n* (%)	26 (43.3)
	Nonsmokers, *n* (%)	0 (0.0)
Pack years	Minimum-maximum, mean±SD	22-150, 61.0±28.7
Disease duration (years)	Minimum-maximum, mean±SD	1-6, 3.0±1.8
Regularity of treatment in the last 30 days	Regular, *n* (%)	19 (31.7)
	Not regular, *n* (%)	26 (43.3)
	No treatment, *n* (%)	15 (25.0)
MRC dyspnea score	Minimum-maximum, mean±SD	1-5, 3.4±1.3
Disease severity (GOLD guidelines)	Mild, *n* (%)	10 (16.7)
	Moderate, *n* (%)	19 (31.7)
	Severe, *n* (%)	14 (23.3)
	Very severe, *n* (%)	17 (28.3)

SD: Standard deviation, GOLD: Global Initiative for Chronic Obstructive Lung Disease, MRC: Medical Research Council

The mean days of not doing usual activities significantly varied with COPD severity in a way that mean score increases as the severity increases (from 8.1 in mild disease to 29.2 in very severe disease) [$P < 0.05$, Table 6].

Dyspnea score was significantly directly correlated to age [$P < 0.05$, $r > 0$, Table 7].

Dyspnea did not significantly correlate with days of feeling worried or tense or anxious [$P > 0.05$, Table 7] in our study.

The mean dyspnea score significantly changed with treatment regularity. It was higher in those with regular treatment (4.3) and least in those without treatment (1.7) [$P < 0.05$, Table 8], and this reflects that our patients become more adherent to treatment only with advance COPD stages and also reflects delay in the diagnosis in early COPD stages.

Table 3: Characteristics of patients according to the severity of chronic obstructive pulmonary disease (Global Initiative for Chronic Obstructive Lung Disease)

Variables	Disease severity				*P*
	Mild (*n*=10)	Moderate (*n*=19)	Severe (*n*=14)	Very severe (*n*=17)	
Age (years), mean±SD	43.8±3.5	52.7±5.9	57.9±6.9	70.3±6.2	<0.001
Sex, *n* (%)					
Male	10 (100.0)	18 (94.7)	9 (64.3)	11 (64.7)	0.021
Female	0 (0.0)	1 (5.3)	5 (35.7)	6 (35.3)	
Monthly income (1000 ID), *n* (%)					
>500	6 (60.0)	6 (31.6)	0 (0.0)	0 (0.0)	<0.001
≤500	4 (40.0)	13 (68.4)	14 (100.0)	17 (100.0)	
Smoking status, *n* (%)					
Current smoker	10 (100.0)	15 (78.9)	7 (50.0)	2 (11.8)	<0.001
Ex-smoker	0 (0.0)	4 (21.1)	7 (50.0)	15 (88.2)	
Nonsmoker	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Pack cigarettes (years), mean±SD	41.4±6.6	52.8±23.0	50.9±17.0	90.1±29.7	<0.001
Disease duration (years), mean±SD	1.1±0.3	3.5±1.8	2.4±1.8	3.9±1.2	<0.001
Dyspnea score, mean±SD	1.0±0.0	3.2±0.6	4.0±0.4	4.8±0.4	<0.001
Regularity of treatment, *n* (%)					
Regular	0 (0.0)	5 (26.3)	4 (28.6)	10 (58.8)	<0.001
Not regular	0 (0.0)	11 (57.9)	8 (57.1)	7 (41.2)	
No treatment	10 (100.0)	3 (15.8)	2 (14.3)	0 (0.0)	

SD: Standard deviation

Table 4: Relation between chronic obstructive pulmonary disease severity and responses of participants to questions of healthy days core module

Questions/response	Statistic	COPD severity level				Total	*P*
		Mild	Moderate	*n*	Very severe		
Would you say that in general your health is	Excellent, *n* (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	<0.001
	Very good, *n* (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
	Good, *n* (%)	8 (80.0)	4 (21.1)	1 (7.7)	0 (0.0)	13 (22.0)	
	Fair, *n* (%)	2 (20.0)	6 (31.6)	1 (7.7)	0 (0.0)	9 (15.3)	
	Poor, *n* (%)	0 (0.0)	9 (47.4)	11 (84.6)	17 (100.0)	37 (62.7)	
How many days during the past 30 days was your physical health not good?	*n*	7	15	13	11	46	<0.001
	Mean±SD	7.1±3.2	20.9±10.5	24.5±10.4	30.0±0.0	22.0±10.8	
How many days during the past 30 days was your mental health not good?	*n*	0	9	9	11	29	0.341
	Mean±SD	-	28.3±5.0	30.0±0.0	30.0±0.0	29.5±2.8	
How many days did poor physical or mental health keeps you from doing your usual activities?	*n*	4	15	13	12	44	<0.001
	Mean±SD	8.8±3.5	19.9±10.3	26.3±9.0	29.2±2.9	23.3±9.8	

SD: Standard deviation, COPD: Chronic obstructive pulmonary disease

Even in mild COPD stage, there was significant HRQOL affection [Tables 4-6], and this is similar to a Spanish study in 2006 which also concluded that patients with stable COPD show a reduction of their HRQOL, even in mild stages of the disease.[5]

The overall results of study reflect the negative impact of COPD on HRQOL of the patients, and we found that the higher the severity of COPD, the lower the quality of life, and this is similar to an Indian study conclusion (patients with COPD showed significantly reduced [HRQOL]) published in 2016.[6]

A South Korean study done between 2007 and 2012 also concluded that the higher the severity of COPD, the lower the HRQOL.[7]

Conclusions

HRQOL of COPD patients is considerably impacted by this disease, and the impaction differs according to the severity stage of COPD; the higher the severity of COPD, the lower the quality of life. As the goal of therapy in COPD is to improve symptoms and quality of life, assessment of HRQOL is mandatory in all COPD patients and it is an important part of disease management and follow-up. It is necessary to increase public awareness about tobacco smoking harms because of their direct effect on development and severity of COPD.

Financial support and sponsorship

Nil.

Table 5: Relation between chronic obstructive pulmonary disease severity and responses of participants to questions of activity limitations module

Questions/responses	Statistic	Disease severity				Total	*P*
		Mild, *n* (%)	Moderate, *n* (%)	Severe, *n* (%)	Very severe, *n* (%)		
Are you limited in any way in any activities because of any impairment or health problem?	Yes	10 (100.0)	18 (94.7)	12 (100.0)	17 (100.0)	57 (98.3)	0.554*
	No	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	1 (1.7)	
How long have your activities been limited because of your major impairment or health problem?	Days	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	1 (1.7)	<0.001*
	Weeks	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	1 (1.7)	
	Moths	10 (100.0)	4 (21.1)	7 (50.0)	0 (0.0)	21 (35.0)	
	Years	0 (0.0)	14 (73.7)	6 (42.9)	17 (100.0)	37 (61.7)	
Because of any impairment or health problem, do you need the help of other persons with your personal care needs?	Yes	0 (0.0)	0 (0.0)	3 (21.4)	13 (81.3)	16 (27.1)	<0.001
	No	10 (100.0)	19 (100.0)	11 (78.6)	3 (18.8)	43 (72.9)	
Because of any impairment or health problem, do you need the help of other persons in handling your routine needs?	Yes	0 (0.0)	7 (46.7)	7 (50.0)	17 (100.0)	31 (55.4)	<0.001
	No	10 (100.0)	8 (53.3)	7 (50.0)	0 (0.0)	25 (44.6)	

*Significant at $P<0.05$

Table 6: Relation between chronic obstructive pulmonary disease severity and responses of participants to questions of healthy days symptoms module

Questions/responses	Statistic	COPD severity level				Total	*P*
		Mild	Moderate	Severe	Very severe		
During the past 30 days, for about how many days did SOB make it hard for you to do your usual activities?	*n*	10	16	5	13	44	
	Mean±SD	8.1±3.2	20.9±10.9	27.0±6.7	29.2±2.8	21.2±10.6	<0.001
During the past 30 days, for about how many days have you felt sad, blue, or depressed?	*n*	4	12	4	12	32	
	Mean±SD	11.3±2.5	26.8±7.6	30.0±0.0	30.0±0.0	26.5±7.6	<0.001
During the past 30 days, for about how many days have you felt worried, tense, or anxious?	*n*	0	14	6	10	30	
	Mean±SD	-	27.3±7.1	17.8±13.3	30.0±0.0	26.3±8.6	0.013
During the past 30 days, for about how many days have you felt you did not get enough rest or sleep?	*n*	10	18	6	17	51	
	Mean±SD	8.1±3.2	18.6±11.9	22.0±12.4	30.0±0.0	20.7±11.3	<0.001

SD: Standard deviation, COPD: Chronic obstructive pulmonary disease, SOB: Shortness of breath

Table 7: Correlations between dyspnea score with some studied factors

Variables	Statistic type	Magnitude
Age (years)	Pearson's correlation	0.761
	P	<0.001
	n	60
Packs per year	Pearson's correlation	0.580
	P	<0.001
	n	60
Disease duration (years)	Pearson's correlation	0.494
	P	<0.001
	n	60
Days with nongood physical health	Pearson's correlation	0.753
	P	<0.001
	n	46
Days with nongood mental health	Pearson's correlation	0.344
	P	0.068
	n	29
Days cannot do usual activities	Pearson's correlation	0.742
	P	<0.001
	n	44

Contd...

Table 7: Contd...

Variables	Statistic type	Magnitude
Days cannot do usual activities due to SOB	Pearson's correlation	0.768
	P	<0.001
	n	44
Days of feeling sad, blue, or depressed?	Pearson's correlation	0.716
	P	<0.001
	n	32
Days of feeling worried, tense, or anxious?	Pearson's correlation	0.131
	P	0.492
	n	30
Days not get enough rest or sleep?	Pearson's correlation	0.720
	P	<0.001
	n	51

SOB: Shortness of breath

Table 8: Variation in mean dyspnea score with responses to some items on health-related quality of life

Questionnaire item	Category	*n*	Mean±SD	*P*
Regularity of treatment	Regular	19	4.3±0.9	<0.001
	Not regular	26	3.8±0.8	
	No treatment	15	1.7±1.1	
Severity of COPD	Mild	10	1.0±0.0	<0.001
	Moderate	19	3.2±0.6	
	Severe	14	4.0±0.4	
	Very severe	17	4.8±0.4	
Current health status	Good	13	1.8±1.0	<0.001
	Fair	9	2.7±1.0	
	Poor	37	4.2±0.8	
Limitation in activities	Yes	57	3.5±1.4	0.744
	No	1	3.0±0.0	
Duration of limitation inactivities	Days	1	3.0±0.0	<0.001
	Weeks	1	3.0±0.0	
	Moths	21	2.3±1.4	
	Years	37	4.1±0.8	
Need help for personal care	Yes	16	4.8±0.4	<0.001
	No	43	2.9±1.2	
Need help for routine needs?	Yes	31	4.4±0.6	<0.001
	No	25	2.4±1.3	

SD: Standard deviation, COPD: Chronic obstructive pulmonary disease

Conflicts of interest

There are no conflicts of interest.

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Annex 1

HRQOL Questionnaire available from https://www.cdc.gov/hrqol/hrqol14_measure.htm

Healthy Days Core Module

1. Would you say that in general your health is
   a. Excellent
   b. Very good
   c. Good
   d. Fair
   e. Poor
2. Don't know/Not sure
3. Refused
4. Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?
   a. Numbers of days…….
   b. None
5. Don't know/Not sure
6. Refused
7. Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?
   a. Numbers of days…….
   b. None
8. Don't know/Not sure
9. Refused
10. During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?
    a. Numbers of days….
    b. None
11. Don't know/Not sure
12. Refused

Activity Limitations Module

1. Are you LIMITED in any way in any activities because of your disease?
   a. Yes
   b. No
2. Don't know/Not sure
3. Refused
4. What is the MAJOR impairment or health problem that limits your activities?
   a. Arthritis/rheumatism
   b. Back or neck problem
   c. Fractures, bone/joint injury
   d. Walking problem
   e. Lung/breathing problem
   f. Hearing problem
   g. Eye/vision problem
   h. Heart problem
   i. Stroke problem
   j. Hypertension/high blood pressure
   k. Diabetes

l. Cancer
m. Depression/anxiety/emotional problem
n. Other impairment/problem

5. Don't know/Not sure
6. Refused
7. For HOW LONG have your activities been limited because of your disease?
   a. Days
   b. Weeks
   c. Months
   d. Years
8. Don't know/not sure
9. Refused
10. Because of your disease, do you need the help of other persons with your PERSONAL CARE needs, such as eating, bathing, dressing, or getting around the house?
    a. Yes
    b. No
11. Don't know/not sure
12. Refused
13. Because of your disease, do you need the help of other persons in handling your ROUTINE needs, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?
    a. Yes
    b. No
14. Don't know/Don't sure
15. Refused

Healthy Days Symptoms Module

1. During the past 30 days, for about how many days did SOB make it hard for you to do your usual activities, such as self-care, work, or recreation?
   a. Numbers of days…….
   b. None
2. Don't know/not sure
   Refused
3. During the past 30 days, for about how many days have you felt SAD, BLUE, or DEPRESSED?
   a. Numbers of days……
   b. None
4. Don't know/not sure
   Refused
5. During the past 30 days, for about how many days have you felt WORRIED, TENSE, or ANXIOUS?
   a. Numbers of days
   b. None
6. Don't know/not sure
   Refused
7. During the past 30 days, for about how many days have you felt you did NOT get ENOUGH REST or SLEEP?
   a. Numbers of days….
   b. None
8. Don't know/not sure
9. Refused

10. During the past 30 days, for about how many days have you felt VERY HEALTHY AND FULL OF ENERGY?
    a. Numbers of days……
    b. None
11. Don't know/not sure
12. Refused