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Original Research Article

Quality of life of chronic obstructive pulmonary disease and bronchial asthma patients in covid pandemic time in Delhi NCR

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is an irreversible airway obstruction disease with quality of life (QOL) being the major area for possible improvement. Asthma is a reversible airway obstruction also hampering the QOL of patients. This study aimed to assess the QOL of COPD and Bronchial Asthma patients and find the factors affecting it and relating it to clinical severity of the disease.
Methods: It was a cross-sectional study in a hospital-based setting. SGRQ-C (Saint George's respiratory questionnaire-C) was used to estimate the QOL scores, and spirometry was performed to assess the lung function. These scores were correlated with different Socio-demographic data that was recorded like age, sex, education, socioeconomic status, occupational etc. It was also correlated with clinical profile of patients consisting of duration of illness, smoking status, pack years of smoking, BMI etc. mMRC scale was used to assess dyspnoea.
Results: Patients with asthma or COPD showed impaired health related quality of life (HRQOL). Increasing age, Duration of illness, dyspnoea severity, lower socioeconomic status and pack years of smoking showed strong positive correlation with the reduced QOL. Statistically significant negative correlation was seen between SGRQ-C QOL scores and FEV1 and FEV1/FVC ratio. No association between QOL scores and BMI or gender was observed.
Conclusions: This study showed that Indian patients in Delhi NCR with COPD or Bronchial asthma had reduced HRQOL. Severity of lung function, increased duration of disease, smoking, increasing age and lower socioeconomic status impacted HRQOL negatively.

Keywords: Asthma, Chronic obstructive pulmonary disease, COVID, Quality of life, Saint George's respiratory questionnaire for COPD

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common and preventable disease of lungs involving airways limiting the airflow in and out of the lungs and consists of emphysema and chronic bronchitis.[1,2] Whereas Asthma is a chronic inflammatory disorder of the airways causing recurrent episodes of wheezing, breathlessness, chest tightness and cough (mostly at nights and/or in early morning).[1] According to WHO, there were 3.2 million deaths due to COPD and is third leading cause of death in 2019.[2]

The global burden of disease study for India reported increase in COPD prevalence from 3.3% (28.1 million Cases) in 1990 to 4.4% (55.3 million cases) in 2016.[3] The COVID19 pandemic has disrupted many lives, including

those of people suffering from COPD and their caregivers.[4]

Mortality is just one aspect of a chronic disease like COPD. The health-related quality of life (HRQOL) is severely affected by the disease.[5] HRQOL measurement enables evaluation of medical interventions and detects groups at risk of psychological and behavioural problems. Many studies have been conducted establishing their relation worldwide but fewer studies have been conducted in India.[6] In developing countries like India, people have poor health seeking behaviour. A chronic disease like COPD or asthma have fewer symptoms during initial stages and these patients are missed at initial stages and present to the health care provider during exacerbation which further worsens the quality of life.[6] There are few studies to assess the QOL of COPD patients after COVID-19 worldwide but not as such from India.

A few studies have been done relating the clinical severity of disease like asthma or COPD in patients suffering from COVID. Initially in the COVID pandemic there were concerns about how COVID will affect the outcomes in COPD patients. As there were physical restrictions during the pandemic, the diagnosis and management of COPD was surely challenging but the risk of COPD patients being infected with it and worsening of the disease even after infection came to be less than anticipated.[7]

This study aimed to focuses more on the quality of life of patients with COPD and Bronchial Asthma as compared to the clinical outcomes. How the quality of life of these patients had been affected was what this study targeted to observe – Had it worsened? Had it been unaffected? These questions too were expected to be possibly answered after the completion of this study.

Aims and objectives

Primary objective: To find out the QOL in COPD and Bronchial asthma patients in COVID pandemic time.

Secondary objective: Identifying the parameters affecting the quality of life of COPD and Bronchial Asthma patients. Clinically correlating the parameters to the severity of the disease.

Research question

Does a chronic respiratory disease like asthma or COPD affect the quality of life of patients in NCR Delhi in COVID pandemic time?

Hypothesis

Chronic diseases like asthma and COPD have a negative impact on the QOL of patients and QOL is affected by the increasing severity of the disease in COVID pandemic time.

This study was done to establish a better understanding of relationship between QOL and severity of asthma and COPD in post pandemic era. This study also aimed at identifying the factors that affect quality of life of COPD and bronchial asthma patients. Identifying the factors affecting QOL and then improving them might be helpful in improving the disease severity.

METHODS

This was cross sectional study. Previously diagnosed or newly diagnosed patients of asthma and COPD were included.

The study was conducted in outpatient department (OPD) of Medicine and TB&RD at Lady Hardinge Medical College of Delhi, India.

The sample size was supposed to be all asthma and COPD patients in Medicine and TB&RD OPD who give their consent for study during the two months period of research.

Study sample size was calculated as: $n = Z^2p(1-p)/d^2$

(Where n=sample size, Z=confidence interval, p=prevalence and d = degree of accuracy)

Z at 95% confidence interval = 1.96, prevalence was taken as 10% = 0.1 from previous studies and d was taken as 5% = 0.05.

Putting the above values in the formula:

$n = Z^2\ p(1-p)/d^2$

$n = \{1.96\times1.96\times0.1(1-0.1)\}/(0.05\times0.05) = 138$

So, sample size was 138 and adding 10% non-responders to it makes it 152.

As the study was being conducted for a short period of two months, maximum number near to the sample size was tried to be reached i.e., minimum 50 cases.

A total of 51 cases were included in the study. Twenty-one of them being COPD patients and the rest asthma patients.

Case selection method

Consecutive study participants satisfying eligibility criteria and voluntarily willing to participate in the study.

Inclusion criteria

Older or newly diagnosed patients of asthma and COPD; age ≥18 years.

Exclusion criteria

Subjects with recent myocardial infarction, stroke, recent surgery, trauma which hamper QOL or on mechanical ventilator. Subjects who do not give consent for spirometry.

Subjects were recruited after obtaining approval from Institutional Ethics Committee (IEC), after attaining written consents from them. Patients who satisfied the eligibility criteria were included from the medicine and TB&RD OPD. The confidentiality of the participants was maintained throughout the study. The patients were given a detailed elaboration about the purpose of the study and its importance. Spirometry was conducted as per American Thoracic Society standards by RMS Helios 703. At the beginning, satisfactory demonstrations were given regarding the equipment and the procedure of the study. During the procedure, the subjects inhaled deeply and then exhaled with maximum effort as much as possible into the mouthpiece after following 5 minutes sitting rest in the lab. Maximal expiratory flow loops will be obtained. Three different readings were obtained and the best effort was considered as appropriate and values were recorded in the proforma.

Following PFT parameters were analysed for the study.

FEV1: Forced expiratory volume in 1st sec; FEV1/FVC.

Subjects were then required to fill out the SGRQ (Saint George's Respiratory Questionnaire).

Study design

This was a cross-sectional study done amongst the patients of asthma and COPD. Their quality of life was assessed using Saint George's Respiratory Questionnaire.

Data collection

Socio-demographic information was collected from every patient, which included age, sex, education, socioeconomic status, occupation, and area of residence (rural or urban). Patients were inquired about their duration of illness, smoking status and duration of smoking. Pack years of smoking were calculated for smokers. The height and weight were recorded to calculate body mass index (BMI). A detail history, findings was recorded in a proforma.

Socioeconomic status was assessed using modified Kuppuswami scale (CPI – 2022). This included asking about three parameters namely education, occupation of head of the family and total income of the family from all sources. Then they are scored accordingly and on the basis of these scores, they are divided into five classes namely upper, upper-middle, lower-middle, upper-lower and lower.[9]

Study tools

SGRQ-C was used to assess the quality of life of patients with asthma and COPD. They were instructed to fill the questionnaire as honestly as possible. SGRQ is a standardized, self-administered questionnaire for measuring impaired health and perceived HRQOL in airways disease. It consists of two parts – first part being the symptoms component and the second part being activities causing or limited by breathlessness.[10]

Items in both parts are scaled. Total score adds up to 100 (ranging between 0 to 100) with higher scores indicating more limitations and lower scores indicating better HRQOL. Significant correlations are seen between total score and presence of cough, sputum, and wheeze; - Significant correlations between symptom, activity, and impact domains and other measures of disease activity are also seen. SGRQ is freely available for clinicians to use.[10] Nevertheless, permission sought for using it had been granted.

Global initiative for chronic obstructive lung disease (GOLD) criteria has been used to assess the severity of the disease. The GOLD guideline uses a combined COPD assessment approach to group patients according to symptoms and previous history of exacerbations. Symptoms are assessed using the Modified British Medical Research Council (mMRC) or COPD assessment test (CAT) scale.[8]

The modified British Medical Research Council (mMRC) five-point scale for breathlessness was used to assess dyspnoea.

Statistical analysis

Data entry and statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software. The mean and standard deviation of HRQOL scores were calculated. Relationship between HRQOL scores and continuous variables was assessed using Spearman's correlation coefficient (r). For assessing the relationship between categorical variables and HRQOL scores, Kruskal-Wallis test was used. P value of < 0.05 was considered statistically significant.

Ethical considerations

Ethical approval was taken from the institutional ethics committee before the initiation of study. Written informed consent was taken from the subjects before giving them the questionnaire and their identity is kept with confidentiality.

RESULTS

The patients' demographic and clinical profiles are shown in Table 1.

Table 1: Demographic and clinical profiles of study subjects.

Characteristics	Frequency (%)
Age (mean±SD)	46.27±2.305 years
Sex	
Male	23 (45.1)
Female	28 (54.9)
Education	
Illiterate	16 (31.4)
Up to primary	10 (19.6)
High school	10 (19.6)
Intermediate and above	15 (29.4)
Occupation	
Unemployed	31 (60.8)
Unskilled	2 (3.9)
Semi-skilled worker	7 (13.7)
Skilled worker	2 (3.9)
Clerical/shop/farm	7 (13.7)
Professional	2 (3.9)
Socio-economic status	
Upper	4 (7.8)
Upper middle	5 (9.8)
Lower middle	7 (13.7)
Upper lower	16 (31.4)
Lower	19 (37.3)
Smoking status	
Never smoker	34 (66.7)
Former smoker	13 (25.5)
Every day smoker	4 (7.8)
Pack year of smoking (mean±SD)	6.829±2.4822
Duration of smoking (mean±SD)	8.14±14.309 years
Duration of illness (mean±SD)	6.7437±1.210259 years
Dyspnea (mMRC scale) (mean±SD)	1.92±0.868
BMI (mean±SD)	22.3176±0.61131 kg/m²

Table 2: Spirometry results of study subjects.

Severity	Frequency (%)
Mild	12 (23.5)
Moderate	4 (7.8)
Moderately severe	8 (15.7)
Severe	13 (25.5)
Very severe	14 (27.5)

Lung function severity based on FEV1* (according to European respiratory journal, 2005)[17]; Mean FEV1% predicted±SD: 50.751±19.8088; Mean FEV1/FVC predicted ± SD: 61.3761±8.35932; *FEV1: Forced expiratory volume in 1st second; FVC: Forced vital capacity

The mean age of the patients was 46 years. Out of the total diagnosed cases of asthma and COPD twenty-three were males and twenty-eight females. There were twenty-one COPD cases out of the total fifty-one cases and rest were of asthma. There were six females among the COPD patients, rest fifteen were males (Table 1).

Out of the total patients 31.4 % were illiterate, 60.8% were unemployed, 37.7% were from lower socioeconomic status, with a mean pack years of smoking 6 years (Table 1).

The mean BMI of the patients came out to be 22.31 kg/m^2

The clinical characteristics showed mean duration of illness of 6 years, mean dyspnoea severity score of 1.92 (Table 1).

A total 23% of the subjects had mild airway obstruction, 25.5% of them had severe obstruction whereas 27.5% of them had very severe airway obstruction. Mean FEV1 (% predicted) came out to be 50. 75% and mean FEV1/FVC (% predicted) was 61% (Table 2).

Table 3: Classification of COPD according to GOLD criteria.

GOLD Stage	Frequency (%)
GOLD 1 (FEV1 ≥80%)	1 (4.7)
GOLD 2 (FEV1 50%-79%)	9 (42.85)
GOLD 3 (FEV1 30%-49%)	9 (42.85)
GOLD 4 (FEV1 <30%)	2 (9.5)

*(Figures in parenthesis denote percentages. FEV1: Forced expiratory volume in 1 second, FVC: Forced vital capacity)

Severity of 4.7% subjects was GOLD 1, 42.85% subjects were GOLD 2, 42.85% was GOLD 3 and 9.5% was GOLD 4 (Table 3). COPD severity according to GOLD criteria was found to have a positive correlation with pack years of smoking but it was statistically insignificant (p value = 0.278).

Table 4: Quality of life scores of COPD and Bronchial asthma patients.

	Symptom score	Activity score	Impact score	Total score
Mean	39.9859	55.3473	36.9329	42.9757
Standard deviation	14.82806	16.81106	19.37776	15.56908
Range	62.86	84.78	86.71	73.64

The mean symptom, activity, impact and total scores were 39.98, 55.34, 36.93 and 42.97 respectively. These scores show significant impairment in all domains (symptom, activity and impact) as compared to the reference values (Table 4).

Significant negative correlation was found between lung function and Quality of life scores across all domains (Table 5).

Table 5: Correlation of lung function with SGRQ-C scores.

	Symptom score		Activity score		Impact score		Total score	
	R value	P value	R value	P value	R value	P value	R value	P value
FEV1%	-0.548	<0.001	-0.314	0.025	-0.496	<0.001	-0.571	<0.001
FEV1/FVC	-0.317	0.023	-0.187	0.019	-0.409	0.003	-0.428	0.002

FEV1: Forced expiratory volume in 1 second, FVC: Forced vital capacity, †SGRQ-C: St. George's respiratory questionnaire for COPD patients.

Table 6: Correlation of continuous variables with SGRQ-C scores.

Variables	Symptom score		Activity score		Impact score		Total score	Symptom score
	R value	P value	R value	P value	R value	P value	R value	P value
Age	0.254	0.072	0.125	0.384	0.303	0.031	0.082	0.568
Duration of illness	0.320	0.022	0.026	0.857	0.231	0.103	0.024	0.867
mMRC dyspnea scale	0.383	0.006	0.666	<0.001	0.396	0.004	0.547	<0.001
Pack years of smoking	0.076	0.014	0.114	0.422	0.083	0.046	0.044	0.039
BMI	-0.189	0.185	-0.088	0.539	-0.297	0.034	-0.232	0.102

*Spearman's rank correlation coefficient. mMRC: Modified Medical Research Council, BMI: Body mass index, SGRQ-C: St. George's respiratory questionnaire for COPD patients

Table 7: Association of HRQOL with categorical variables.*

Variables	Symptom score		Activity score		Impact score		Total score	
	Mean	P value	Mean	P value	Mean	P value	Mean	P value
Sex								
Male	26.35	0.880	26.02	0.992	27.04	0.650	25.91	0.970
Female	25.71		25.98		25.14		26.07	
Education								
Illiterate	33.53	0.66	29.13	0.590	30.38	0.032	31.31	0.293
Up to primary	26.85		27.90		25.60		26.80	
High school	20.00		24.60		22.85		21.20	
Intermediate and above	21.40		22.33		23.70		23.00	
SES								
Upper	22.00	0.129	26.88	0.027	15.50	0.014	17.75	0.042
Upper middle	10.50		9.90		16.20		15.80	
Lower middle	28.57		21.50		27.86		23.86	
Upper lower	26.28		24.66		25.88		25.25	
Lower	29.74		32.84		30.21		31.84	

*Kruskal-Wallis test, HRQO: Health-related quality of life

Age, duration of illness, dyspnoea and pack years of smoking (except in activity domain) had a statistically significant positive correlation with QOL scores in all domains. Whereas BMI was not found to have statistically significant correlation with the QOL scores (Table 6).

Socioeconomic status was found to have a statistically significant association with QOL scores except the symptom domain. Education (except in impact domain) and gender did not affect the QOL scores in a statistically significant manner (Table 7).

DISCUSSION

The results of the study reflected an impaired QOL among the COPD and asthma patients that were taken in this study using Saint George's Respiratory Questionnaire (SGRQ – C). QOL was affected across all the domains especially the activity score whereas impact score was the least affected. This study shows that Indian patients have somewhat similar impairment in QOL as the patients of asthma and COPD in other countries as were reported in previous studies.[11,12]

The scores of QOL in this study are at a higher end when compared with community-based studies as this was carried out in a hospital bases setting and patients in India due to their poor health seeking behaviour report to the hospital only when their condition starts to hinder them on a regular basis.[6]

This study had only one patient with GOLD 1 severity of COPD, 9 each with GOLD 2 and GOLD 3 and 2 patients with GOLD 4 severity of COPD. This could be due to the fact that patients visit hospitals mostly after the symptoms start to bother their daily life on a regular basis and thus report at later stage. Also, initial stages of COPD are relatively silent in context to symptoms.

Lung function was adversely affected in patients of both asthma as well as COPD. Out of the total patients, 12 had mildly poor lung function, 4 had moderately poor lung function, 8 had moderately severe lung function, 13 were having severe lung function and 14 were very severe. Here also, the major chunk of the patients had severe or very severe lung function. This could be due to late reporting to the hospital or poor compliance or many other possible reasons that needs to be further explored. Mean FEV1 (% predicted) and mean FEV1/FVC were respectively 50.75% and 61.37%. Both decreased as the quality-of-life scores increased in each domain. This was an observation which was already anticipated and was also shown in multiple studies.[12,13] Gradation of COPD is also based on FEV1 %, therefore indicating poorer quality of life in more severe disease. As for asthma, earlier it's staging, or classification was also based on FEV1 % indicating more severe form of disease having worse quality of life. Although now the staging has been changed to difficulty to treat the disease, more difficult to treat being more severe form of asthma as mentioned earlier. All the domains of QOL were affected by deteriorating lung function. HRQOL scores also showed significant correlation with dyspnoea severity scores. This kind of finding gas also been reported in other studies conducted earlier.[13-15]

Smoking (except in activity domain) is having a positive correlation with lower quality of life. More were the pack years of smoking, more was the SGRQ-C score. Similar results have been seen in other studies conducted earlier as well.[13,14]

Smoking is one of the factors responsible for COPD. More exposure to smoking leads to severe form of disease and thus poorer quality of life. Smoking also independently impacts QOL in a negative way even in other individuals without COPD. Many studies have shown that cessation of smoking helps in improving the QOL scores.[16,17] This fact calls for an active intervention by health care professionals to motivate the COPD patients to quit smoking in order to improve their quality of life.

Duration of illness impacted quality of life negatively. Longer duration of illness accounted for poorer quality of life. Similar findings have been reported by other authors as well.[14]

BMI showed negative correlation with QOL scores though it was statistically insignificant. Although previous studies have also shown that underweight patients had poorer QOL and also, many studies showed no significant association of QOL scores with BMI just like this study, and a few studies have also shown overweight patients to have poorer QOL.[18-20]

Age has a significant correlation with QOL scores especially in symptom and impact domain in this study. Socio-economic status also has a significant positive correlation except the symptom and activity domain in this study and highest QOL scores were found in lower socioeconomic status. QOL worsens with increasing age. Although, there had been a mixed finding by different authors in this regard. Some were similar to this study, some found no correlation, some even reported younger patients had poorer QOL.[2,14,20,21] Many authors have found that lower socioeconomic status negatively impacts QOL scores.[22] Reason behind this being very rational that Indian patients have poor health seeking behaviour and poor compliance to treatment. COPD or asthma, both require regular treatment which may be proven costly for poor people and thus difficult to afford.

Gender and education (except in impact domain) did not impact QOL significantly. Although females have been reported to have a poorer QOL in a few studies.[12,15] Similar to this study, may studies have not found any significant correlation between QOL scores and gender.[21,23] Few studies have reported a significant impact of education on QOL.[12,18] But this was not the case in this study except in impact domain. The reasons for the same are not apparent in our data. A possible reason could be a different social structure and attitude towards education in India. This domain still has a scope for studies in future.

This study had few limitations such as a limited time duration leading to a limited sample size. Also, there was a scope for correlating the QOL with other comorbidities or psychological problems but due to limited time it could not be done. This could be a topic for further studies.

CONCLUSION

There is impaired quality of life in patients with COPD and bronchial asthma which worsens as the severity of disease increases. Lung function severity, duration of illness, pack years of smoking, increasing age, dyspnoea severity and lower socioeconomic status impacted quality of life of COPD and bronchial asthma patients adversely. COPD is a gradually progressive disease and incurable with limited improvement in lung function, the comparatively treatable aspects of QOL can be the center of management. This will make the care of COPD more effectively. For asthma also, the more treatable aspects of QOL needs to be focused upon. While evaluation of COPD patient is done, equal

importance should be given to QOL improving factors as given to the lung function.

Further research needs to be done to assess the impact of comorbidities on QOL of COPD and bronchial asthma patients. The impact of family support as well as social support on QOL of COPD and bronchial asthma patients also needs to be studied in India. In developing countries like India, combustion of biomass fuels for cooking is one of the major reasons for COPD in females. This is also an arena to be explored further.

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