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ASSESSMENT OF KNOWLEDGE AND HEALTH RELATED QUALITY OF LIFE AMONG CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS: AN OBSERVATIONAL STUDY.

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ABSTRACT

INTRODUCTION: Chronic obstructive pulmonary disease (COPD) is characterized by airflow limitation that is not fully reversible. Quality of life has been shown to be poor in patients with chronic obstructive pulmonary disease (COPD). **OBJECTIVE:** The main objectives of the study are to assess knowledge and healthrelated quality of life (HRQoL) of COPD patients and to find a link between these two parameters. **DESIGN:** observational, cross sectional survey involving 202 COPD patients was conducted by using disease specific questionnaires. Knowledge was assessed with the Bristol COPD knowledge questionnaire (BCKQ) and HRQoL was assessed with St. George's Respiratory Questionnaire (SGRQ-C). **R E S U L T S :** Patients showed a little better knowledge (34%–54%) about disease symptoms, whereas the other areas related to epidemiology, etiology, breathlessness, exercise and smoking showed poor knowledge (11%–29%). Majority of the patients did not know about their medications and its use, indicating very poor knowledge (0%–7%). Similarly scores for HRQoL were also calculated and average score was 42.3% and mean component scores were 72.3%, 34.7% and 32.7% for symptoms, activity and impacts, respectively. We also found an association between COPD knowledge and HRQoL (p < 0.036). COPD symptoms such as dyspnea had major role in worsening HRQoL in addition to physical limitations and impact of disease. **CONCLUSION:** Awareness regarding disease condition and medications among COPD patients was found out to be significantly low. HRQOL was impaired in patients particularly due to disease symptoms. Educational interventions are required that improves COPD patients' disease understanding and assist them to improve theirhealth-related quality of life.

Key words: Chronic obstructive pulmonary disease, Health Related Quality of Life, Knowledge and Observational.

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INTRODUCTION

Chronic obstructive pulmonary disease is a serious and growing health issue that is frequently undertreated.[1] Chronic obstructive pulmonary disease (COPD) is defined by the presence of poorly reversible airflow limitation.[2] COPD is a complicated condition with pulmonary and extra-pulmonary manifestations. It's a multi-component, heterogeneous disease with a wide range of clinical, functional, and radiological signs, even among patients with the same degree of airwayblockage. [3,4] COPD was divided in 4 stages (mild, moderate, severe, very severe), based ona specific breathing test called spirometry grading.[5] COPD is the result of a complex interaction between long-term repeated exposures to noxious particles and gases, as well as a number of host features such genetics, airway hyper- responsiveness, and poor lung development during childhood.[6] Smoking, air pollution, genetics, BMI, respiratory infections, and other lung disorders are all significant risk factors for COPD.[7] COPD is a prominent cause of illness and mortality globally, resulting in a significant and growingsocial and economic burden.[8] Rise in COPD cases can be seen from survey findings. A survey conducted in 1990 among patients aged 30 years or more, reported about 227.3 million COPD cases. In 2010 the number of cases grown to 384 million with 168 million male and 160 million females with COPD.[9] The annual societal cost of COPD was $62.4 billion (2013), with $32 billion of indirect costs and $20.4 billion of direct costs.[10] Despite advancements in illness management, morbidity and death rates continue to grow across the world. [11] Every year, over three million people die throughout the world.[12] In 2012, a major epidemiological survey in theMiddle East and North Africa area (BREATHE) performed in 11 countries found that the incidence of COPD was 2.1% among Pakistani people over the age of 40.[13] A cross-sectional research was conducted on two types of respiratory patients in a hospital population. The most prevalent kind was discovered to be TB (T.B), followed by asthma and COPD.[14] Although much advancement has been made in the field of modern medicine, COPD still remains as an irreversible condition that cannot be cured completely. Once an individual diagnosed with COPD, he would be on daily management and life-long treatment. Even during the stable period,the patient's self-management behavior would be very important for preventing the disease progression and minimizing future exacerbations and hospitalizations.[15] The aims of COPD treatment are to preserve near-normal lung function, no activity restrictions, improve symptoms, and prevent exacerbations from recurring.[16]

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However, despite being on therapy, many patients are unable to achieve these objectives, resulting in low HRQoL.[16] This is mostly due to a misalignment between what physicians recommend and what patients actually do.[17] Patient knowledge regarding disease and its management is crucial in both developed and developing nations because literature shows that the majorities of patients are uneducated and have poor socioeconomic level.[18] Patients frequently have little or no comprehension of their symptoms, potential indications of exacerbations, or the particular actions that must be performed.[19] Patients usually had no idea how to alleviate their symptoms or remove secretion by adopting positioning and pursed-lip breathing.[20] A research on the information needs and understanding of COPD patients, found a need for increased instruction on food and self-care.[21] In order to make long-term gains, patient knowledge about illnesses must be evaluated on a regular basis, since it affects HRQoL.[22] COPD also has an impact on patients' daily lives and is a source of HRQoL deterioration. Decline in lung function, severity of symptoms, older age, worsening dyspnea, duration of disease and lower socioeconomic state results in compromised health related quality of life (HRQoL) in COPD patients.[23] The length of disease has a detrimental influence on QOL.[24, 25] one study on COPD physical limitations concluded that one fifth of patients were out of breath even when sitting or lying quietly, speaking, going up and down stairs or doing housework.[26] According to one research, 52% of patients with severe chronic lung disease experienced depression, 22% had anxiety, and 26% had hysteria.[27] Furthermore, social interactions, chores, responsibilities and social acceptance may be influenced, all of which can lead to significant changes in HRQoL for individuals and their families over time.[28] Improved education and optimum use of currently available treatment methods are required to enhance QOL and minimize hospitalizations in COPD patients. There had been quite a number of studies published regarding COPD patient's quality of life both regionally and worldwide, [29,30] but no study was conducted to determine the patient's knowledge and understanding towards their disease in Pakistan. There is no such study in Pakistan that showed association, between HRQoL of COPD effected patients with their disease knowledge, and only few studies on this topic can be found globally.[31] Pakistan continues to suffer with inadequate health literacy, which leads to late disease presentation, poor treatment adherence, and a lack of knowledge about wellness and disease prevention. With poor healthcare facilities and low literacy levels in a country plagued by diseases from both the developing and developed worlds, enhancing healthcare literacy might have a significant impact on the health and well-being of our people.[29] COPD is a worldwide condition that has an impact on patient's health related quality of lives; however, there are few data pertaining to the general public's real knowledge of the disease. Identifying knowledge gaps in patients affected by this condition regionally would be helpful to develop interventions to improve patient education endeavors and HRQoL. The goal of this study is to use a validated disease-specific questionnaire to measure COPD patients' knowledge of their condition, medication usage, disease management, and the impact of COPD on HRQoL and activities of daily life. To determine any relationship between knowledge and quality of life, if exist. To the best of our knowledge, this is the first cross-sectional study in Pakistan that studies knowledge and HRQoL among COPD patients.

Materials and Methods
Study Design, Study Setting, Duration
The present quantitative, exploratory, cross-sectional, questionnaire-based study was performed at outpatient departments of the District Headquarter (DHQ) and teaching hospital Sargodha, as well as the

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Munir hospital in Sargodha, Pakistan. With limited resources, these health care facilities are undoubtedly attempting to deliver better services to their patients. The duration of the study rangedfrom February to December 2021, while data collection for the study was performed between June to September 2021.

Study Population, Sample Size Determination, Sampling Technique

The research study was conducted on inpatients and outpatients attending DHQ and Munir hospital. Both male and female patients with COPD, visiting for routine checkup, attending out- patient department (OPD) for prescription refill, or admitted to wards were approached for the purpose of data collection. All candidates were firstly informed about the importance of study and those who showed willingness were interviewed for suitable data collection. Among these patients, only those patients who were willing to participate and who could understand local language were included. The information was given to the researcher verbally, and the researcher marked off all of the questions on a checklist.

Sample size was calculated by using Raosoft^{TM} sample size calculator with a margin of error of 5%, confidence interval of 95% and response distribution of 50%. An additional factor of 20% was also added to the calculated sample size which was calculated to be n = 39. As a great variation was found in prevalence of COPD area wise and because of availability of time and patients in hospital the data was calculated by convenient sampling technique. Thus a total of 216 questionnaires were distributed and following ethical considerations and taking into account the inclusion criteria a total of n = 202 respondents were selected for final data collection.

Study tools

Pre-validated disease specific Questionnaires were used to access knowledge and HRQoL of COPD patients.

Questions about demographic information (age, gender, education level, marital status, area of residence, employment) were also added. The questionnaires were self-administeredunder supervision. There are people among the respondents who had no formal education, so the contents were explained and filled out accordingly in a few cases to avoid impact and ambiguity in data.

Bristol COPD Knowledge Questionnaire

A validated questionnaire called the Bristol COPD Knowledge Questionnaire (BCKQ) will be used to measure knowledge of COPD patients about their disease. In the BCKQ, 13 questions were developed to measure knowledge of the various topics and were generalized to most COPD patients. Each topic was comprised of a stem of five statements. Respondents were asked to selectif each statement was 'true,' 'false,' or if they did not know. During data analysis, the "Don't Know"responses were merged with false answers in the results, as both are characteristic for the lack of awareness for the disease. Each question response has a unique 'weight'. The lowest possible weight is zero and the highest is 100. It can be finished and scored in twenty minutes.

St. George's Respiratory Questionnaire

The St. George's Respiratory Questionnaire (SGRQ-C) for COPD patients will be used to assess HRQoL. The SGRQ-C is a validated and simplified version of the SGRQ created at St George's, University of London. It is adapted from the original version after extensive data analysis from extensive COPD research. The SGRQ-C was designed using just COPD data; hence it is solely applicable to this condition. It is divided into two sections and has 14 questions regarding the patient's physical, social, and mental health, each with a distinct response choice. The scale runs from 0 to 100, with higher scores indicating more limitations.

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Ethical Considerations

The study was approved by the Institutional Advanced Studies and Research Board, University of Sargodha, Punjab, Pakistan (Ref No. SU/Pharm-909/21; 11 October 2021). Permission was taken from authorized person i.e. Medical Superintendent of hospital for the conduct of research in their respective hospital. A written permission letter was approved by the Medical Superintendent of each hospital to conduct this research. Before data collection, the nature of the study and its aims and objectives were explained to the potential participants. Those who show willingness to enroll in study were assured to keep their information confidential and were asked to provide information on their own without any enforcement from their health care provider or family member so, the person can only give information about how he feels without any biasness. Maximum candidates were informed about their personal data privacy and willingness to refuse participation at any point of data collection. The written permission letter was approved by the Medical Superintendent (MS) of District Headquarter Hospital, Sargodha to conduct this research.

Statistical Analysis

Demographic characteristics, including age, gender, education level, patient type, and employment status of patients, were tabulated, with descriptive statistics (mean ± standard deviation, frequencies, and percentages) provided for all items. Reliability analysis and inferential statistics (chi-square tests) with variables were reported, and tests were performed using IBM SPSS® for Windows (Chicago, IL, USA) v.25.0. p-Values < 0.05 were considered statistically significant.

Results

Demographic profile of study population

Data was collected from both genders (n= 202) i.e. male and female. The study was dominated by male population i.e. 60% while 40% of the population included were females. 54% of the patients were older than 50 years. 72% of the patients included were married, while 59.9% of the patients are residents of rural areas. 53% of study population was also dominated by smokers or ex-smokers while 47% were nonsmokers. 65% of patients included were either illiterate or just had primary level of education and 74.8% of patients were currently unemployed. A detailed description of sociodemographic characteristics of study population is listed in Table 4.1.

Table 3. 1 **Sociodemographic characteristics of participants**

Demographics	Frequency	Percentage
Age		
Up to 30	5	2.5%
31 to 50	88	43.6%
More than 50	109	54%
Gender		
Female	80	39.6%
Male	122	60.4%
Marital status		
Married	83	41.1%
Single	56	27.7%

Widower	63	31.2%
Education		
Illiterate	63	31.2%
Primary school	68	33.7%
Secondary school / college	55	27.2%
Graduate	15	7.9%
Occupation		
Government employee	0	0%
Private employee	51	25.2%
Unemployed	151	74.8%
Residence		
Rural	121	59.9%
Urban	81	40.1%
Smoking		
Smoker	107	53%
Non-smoker	95	47%

Patient responses to BCKQ Questionnaire

A multiple-choice questionnaire (BCKQ) has been used to assess the knowledge for subjects about their underlying disease. It consists of 13 questions; each question contains five stem statements for which there is a right or wrong answer. The participants reflected their responses by indicating statements to be either "true" or "false" or that they did not know. Each question response has a unique 'weight'. The lowest possible weight is zero and the highest is 100. Overall BCKQ scores for each topic are shown in Table 4.3.

Analysis of individual questions showed that some topics were consistently scored highly whereas in others there was poor level of knowledge and beliefs. 58% of subjects were aware of the fact that in COPD there is usually gradual worsening over time (1c). 73.7% subjects were correct in thinking that longstanding asthma can develop into COPD (2c). Examples of the misconceptions included the belief of 27% patients that crushing chest pain is common symptom of COPD (3d) and majority believed that exercise should be stopped if it makes you breathless (7d). In the question on breathlessness, the majority, (12%), were unaware that narrowing of the bronchial tubes was the main cause of their breathlessness (4e) and 75% wrongly thought that breathlessness always meant that oxygen levels were low (4c). Coughing phlegm is a common symptom in COPD (5a) was the statement that got maximum correct responses (93%) but only few patients were aware of phlegm clearing techniques. 37% knew that following a chest infection phlegm usually becomes coloured (6b), and 57% that chest infections does not cause coughing of blood (6a). 11.8% were correct in thinking that exercise does not strain the lungs (7b). 80% subjects were not familiar with the fact that stopping smoking could slow down further lung damage (8b). However, 85.6%

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wrongly expected lung function to improve after smoking cessation (8d). Only 16% patients knew that a 'flu' injection is recommended every year (9a). Majority of patients choose 'don't know' option included the question related to inhaled bronchodilators (Q10), antibiotics (Q11), inhaled steroids (Q12) and oral steroids (Q13). Only 3 subjects out of 202 was correct that steroid tablets does not strengthen muscles (13a) only 1 patients

give right answer that steroid tablets can increase appetite (13d). Of particular concern was that not a single patient answered correctly aboutoral steroids (0%), and only 0%–7% knowledge in the areas related to medications. None of the

Individual domain reached 100% of correct answers. Percentage score of BCKQ is shown in table4.2.

Table 3. 2 Percentage score obtained by BCKQ

Scores	Frequency		Percent
>10-20%	96		47.5
>20-30%	46		22.8
>30-40%	49		24.3
>40-50%	11		5.4
Mean Score		2.88	
Median Score		3.0	

Table 3. 3 Patient responses to BCKQ

Sr. No.	Topic	A	B	C	D	E	Total
1	Epidemiology	9	49	117	20	13	42 (21%)
2	Etiology	60	35	149	21	27	58 (29%)
3	Symptoms	55	168	164	55	100	108 (54%)
4	Breathlessness	30	38	34	51	25	36 (18%)
5	Phlegm	188	113	91	81	30	101 (50%)
6	Infections	116	75	90	61	0	68 (34%)
7	Exercise	29	24	18	41	0	22 (11%)
8	Smoking	40	41	0	29	0	22 (11%)
9	Vaccination	33	0	0	0	0	7 (3%)
10	Inhaled	0	0	0	74	0	15 (7%)
11	Antibiotics	0	0	0	0	24	5 (2%)
12	Oral steroids	0	0	0	0	0	0 (0%)
13	Inhaled steroids	3	0	0	0	0	1 (0.3%)

Knowledge differences between genders and age groups

When the knowledge data was analyzed, the data showed that the patients above 30 years of age have slightly better disease knowledge than those below 30 years.

There was no statistically significant difference in total knowledge scores between males and females when the two genderswere compared. Table 4.4 showed the knowledge scores among different age groups and genders.

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Table 3. 4 Knowledge differences between genders and age groupsDemographics Mean BCKQ Percentage	
Age	
Up to 30	25%± 5
31 to 50	35%± 5
More than 50	35%± 5
Gender	
Male 30%± 5	
Female 30%± 5	

Findings on COPD Quality of Life

Quality of life was determined in patients by using disease specific Questionnaire for COPD patients (SGRQ-C). It is divided into two parts with 3 components. Part I deal with the Symptomsscore, and Part 2 the Activity and Impacts scores. Each question response has a unique 'weight'. The lowest possible weight is zero and the highest is 100.A low score reflected good quality of life and a high score reflected poor quality of life. Mean SGRQ-C total score was 42.3% and mean component scores were 72.3%, 34.7% and 32.7% for symptoms, activity and impacts, respectively. Each component of the questionnaire is scored separately in table 4.5.

Table 3. 5 Mean and Median scores of SGRQ-C

Health	Mean score	Median score
Symptoms	7.23	7
Activity	3.47	4
Impact	3.27	4
Overall HRQoL	4.23	4

Symptoms and HRQoL

HRQoL of majority patients was markedly impaired due to COPD symptoms with median value of 70%.10 patients having HRQoL score>80-90% and 1 patients>90-100% indicate very severe impairment in HRQoL. However, majority (79) of patients scored >60-70%, 32 patients scored >50-60% and remaining 8 patients scored >40-50% for HRQoL in symptoms domain. Noindividual patient scored better HRQoL below 40%. Table 4.6 and figure 4.1 further elaborates frequency of participants and their total obtained scores.

Table 3. 6 Symptoms and HRQoL score

Scores	Frequency	Percentage
>40-50%	8	4.0
>50-60%	32	15.8

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>60-70%	79	39.1
>70-80%	72	35.6
>80-90%	10	5.0
>90-100%	1	.5

Physical activity and HRQoL

In this study population, almost half of the patients (109, 54%) scored between >30-50% showedcompromised HRQoL due to activity limitations of COPD. 32 (15.8%) patients showed a little impact of activity limitations on HRQoL (>20-30%) while 61 (30.2%) patients did not show any significant impact of physical limitations on HRQoL (>10-20%).

Table 3. 7 Physical activity and HRQoL score

Scores	Frequency	Percent	
>10-20%	61		30.2
>20-30%	32		15.8
>30-40%	63		31.2
>40-50%	46		22.8

Impact of COPD on HRQoL

Majority of patient population (104, 51.5%) had an impact on their HRQOL due to COPD (>30- 40%). 23.8% (48%) patients have slight impact of disease on their HRQOL and 24.8% (50) patients showed better HRQOL with no significant impact of disease on it.

Table 3. 8 Impact of COPD on HRQoL score

Scores	Frequency	Percent
>10-20%	50	24.8
>20-30%	48	23.8
>30-40%	104	51.5

Overall Health Related Quality of Life

Median score for overall health related quality of life was calculated to be 40%. A Majority of our study population (100, 49.50%) had compromised HRQoL because of COPD with SGRQ-C score between >40-50%. Out of 202 respondents,48 respondents scored >40-50% and 54 patients scored (>20-30%).Further description is given in table 4.9 and figure 4.4.

Table 3. 9 SGRQ scored of overall HRQoL				
Score	Frequency		Percent	
>20-30%	54			26.7
>30-40%	48			23.8
>40-50%	100			49.5

Association between Knowledge and HRQoL

To access the impact of knowledge of people about their disease on their overall HRQoL and different domains of health

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which contributes to overall health of

people we used chi square test.

Table 3.10 Association between knowledge and overall HRQoL of COPD patients

Parameters	P value
Knowledge and Symptoms	0.753
Knowledge and Activity	0.241
Knowledge and Impact	0.034
knowledge and overall HRQoL	0.036

COPD patient's disease knowledge and their overall HRQoL found to be associated with each other. However when individual domains of SGRQC were compared to that of BCKQ scores it was evident that disease symptoms (0.753) and physical imitation (0.241) were not associated withdisease knowledge. Disease impact in term of physiological and social stress was associated withdisease knowledge (0.034). It indicates that disease knowledge and overall HRQoL of COPD patients are interdependent factors.

DISCUSSION

With 328 million COPD patients globally,[32] it is of great importance to understand the HRQoLin COPD diagnosed patients as well as knowledge of patients about their disease. By assessing the HRQoL and understanding of patients about their disease we can help patients to increase their health status. Our study is the first one to relate knowledge of patients about their disease with their HRQoL, by using standard SGRQ-C and BCKQ designed solely for COPD patients. The findings of this study revealed a considerable understanding of COPD patients' knowledge and HRQoL.

In the present work, 60.4% (n=122) of patients were males. COPD is a male dominant disease, the high prevalence in males is due to higher prevalence of smoking in this gender, and also males are more exposed to smoking than females.[33]. While 39.6% (n=80) were females. Also, more frequent occupational exposures of

significance are present in men.[34] In this study, 54% (n=109)patients were above 50 years while 43.6% (n=88) were between 31 to 50 years and only 2.5% (n=5) were below 30 years of age. A past study showed that old age (50 years and above) was significantly associated with high prevalence of COPD. [35]

In this study, the prevalence of COPD in the smoker group (both former and current smoker) wasfound to be higher than that in the non smoker group. Similar findings were reported in several studies.[36, 37] Many epidemiological studies have found that cigarette smoking is by far the most important risk factor for COPD. It is also known that total pack and years of smoking are predictive

of COPD mortality.[38] Also, Lindberg et al. found a high cumulative incidence of COPD after 10 years of smoking.[39] This emphasizes the importance of early smoking cessation in the reduction of incidence of COPD.

Data analysis showed no statistically significant difference in average knowledge scores between males and females. However, respondents above 30 years of age showed slightly better disease knowledge than those below 30 years. These findings were consistent with previous studies. [40, 41] This study showed that patients provided correct answers of an average 18% of knowledge (BCKQ) questionnaire and 82% responses was either missing or wrong. The overall knowledge ofpatients with COPD was fairly restricted (<50%), with many not even knowing the

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name of their condition, as indicated by previous research.[42-45] there was no statistically significant relationship between patients' knowledge and their age, gender, education level, or smoking status. These findings were comparable with the findings of other research in which a similar lack of knowledge was reported independent of patient demographics.[46, 47]

Disease knowledge is critical educational components that can aid individuals in improving their ability to control their own health. Significant knowledge deficits (11%–29%) were found in the topics of epidemiology, aetiology, breathlessness, and exercise, as well as obvious knowledge deficits (0%–7%) in the topics of medications such as inhaled steroids, inhaled bronchodilators, oral steroids, antibiotics, and vaccination in COPD patients. Lack of understanding about medications appears to be a widespread problem among COPD patients, regardless of nation or healthcare condition.[42, 48] Phlegm, symptoms, and chest infections were the categories with the highest percentages of right responses (>50%), perhaps indicating areas of expertise that engage patients more directly, and these findings were consistent with a prior research.[49] Different variables that might impact the understanding of complicated knowledge, including low literacy, lack of counseling by physician, anxiety and depression status of COPD patients and caregivers.[49-51] Topics of patient education for COPD should include smoking cessation, effective use of inhaler devices, and early diagnosis of exacerbation, according to the Global Initiative for ChronicObstructive Lung Disease (GOLD) 2020.[52] These aspects should be taken into account by healthcare practitioners throughout their educational initiatives.

COPD-related knowledge has been found to correlate with self-management behaviour in patients.[53] Collingsworth et al found that patients who received education had a lower rate of COPD- related readmission.[54]

Effective patient education is critical for improving disease understandingand long-term outcomes in COPD patients.

Area of residence, education, and gender had no statistically significant effect on HRQOL scores. Earlier studies have had similar findings.[55, 56] Education has been shown to have an influenceon QOL ratings, however this was not the case in this study.[57] The reasons for this are not clear from our data, but it might be attributable to the Pakistani population's diverse social structure and appreciation of education. This is an area that needs more investigation.

HRQoL was diminished across all SGRQ-C dimensions with an average score of 42.3%. However, patients scored higher in the symptom domain (72.3%) than in the activity (34.7%) or impact domains (32.7%). It indicates that COPD symptoms had greater influence on compromised HRQoL than activity restriction and psychological impact of disease. Similar results were reported from the studies performed in other countries with symptoms having greater and impact having least effect on quality of life. [55, 58]

In our study, the symptom domain was also strongly associated with dyspnea. HRQOL showed significant correlation with dyspnea in earlier studies.[59] Past data survey from patients with COPD identified increased coughing, shortness of breath, fatigue, and increased sputum production that had the greatest impact on their wellbeing (42%, 37%, 37%, and 35%, respectively).[60] Respiratory symptoms have been discovered to be more directly linked to HRQOL than FEV1 impairment.[61] This might imply that symptoms have a greater influence onQOL than the actual airway restriction measured by FEV1.[61]

Physical activity restrictions was 2nd leading cause of compromised HRQoL among COPD patients (>30-50%). As lung

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function deteriorates progressively, the activity is hampered leadingto poor QOL. Disease severity in COPD affects exercise tolerance such as walking distance. A study in pulmonary rehabilitation has shown that assessment of exercise tolerance correlates well with disease severity. Also, it corresponds well with HRQoL scores.[62] Javier et al. have shownthat COPD had a considerable impact on daily activities in patients. Aspects of daily life are most affected, either due to the severity of the disease or the existence of social, economic, or occupational factors that could interfere with the management of the disease or complicate its progression.[63]

We also attempted to link people's understanding of their disease to their overall health-related quality of life. COPD knowledge was found to be negatively related to HRQoL; hence, the higher the knowledge level, the poorer the study participants' self-reported HRQoL.[64] This result was unexpected, but one explanation is that, despite increased disease awareness, patients may lack theability or self-efficacy to change behaviors' related to their disease condition, negatively affecting their HRQoL.[65] Second, increased awareness of the serious diagnosis may lead to increased stress, fear, and even depression, negatively impacting their HRQoL.[66]

3rd and last domain of SGRQ-C was impact of disease, covering psychological disturbances resulting from respiratory

disease, scored an average of 32.7% for compromised HRQoL. 51.5% patients (n=104) had >30-40% psychological impact of COPD on their deteriorated HRQOL. The impact domain was also strongly associated with anxiety (alone or with depression). The origin ofthe impact domain, covering psychological disturbances resulting from respiratory disease, partly explains these findings. Depression and anxiety symptoms are associated with increased perception of dyspnea.[67] Specifically, previous studies of large samples of COPD patients havefound an association between psychological impairment (i.e., anxiety and/or depressive symptoms) and worse respiratory-specific HRQoL, independent of COPD severity.[68-70]

In this study, disease knowledge and overall HRQoL was found to be associated (p=0.036). The future analysis showed strong association between patient's disease knowledge with impact of disease on HRQoL (anxiety, panic) with a significance value of 0.034. The SGRQ-C activity andsymptom dimensions were not linked to disease knowledge with p-value 0.753 and 0.241 respectively. Overall, the results were similar to prior research in terms of HRQoL mean scores and correlations. [64] This study highlights that Pakistani COPD patients suffer somewhat similarreductions in HRQoL as do COPD patients from other countries.[71, 72]

Table 4.1 Previous findings about COPD knowledge and HRQoL

Authors	Country	Study Design	Clinical Indicators	Key Findings and Outcomes
Martyn R Partridge, RobertoW Dal Negro, and Dario Olivieri[73,74]	Europeancountries	ntitativesurvey	Needs of peoplewith asthma andCOPD, identify opportunities forimproved care.	Patient satisfaction washigh, but information demands were unmet, and the emotional toll of disease was overlooked.
Julie AGazmararian,Mark VWilliams,Jennifer Peel,David WBaker [75]	Cleveland;Houston; South Florida, and Tampa	Interview based survey	Relationship between health literacy and knowledge of disease	Health literacy was found to be linked to disease knowledge onits own.
Fatma IşılUzel, Pelin lağ, Seda TuralÖnür, Demet Turan, Esin Yentürk, and EsinTuncay [76]	Turkey	Cross-sectional	Evaluation of the basic knowledge ofpatients	There was a paucity ofawareness among COPD patients.

Raksha Thakrar, Gopala Krishna Alaparthi, Shyam Krishnan Krishna Kumar, K. Vaishali, C. P. Zulfeequer, and R. Aanad [20]	India	sectionalsurvey	Awareness amongst COPD patients about disease and pulmonary rehabilitation	Suggest that public education regarding the condition and the scope of pulmonary rehabilitation is urgently needed.
Adrienne S. Scott, Marcel A. Baltzan, Esther Dajczman &Norman Wolkove [21]	Canada	sectionalsurvey	Information needsand knowledge ofpatients with COPD	More nutrition andself-management instruction is still required.
Romain Kessler, Elisabeth Ståhl, Claus Vogelmeier, John Haughney, Elyse Trudeau, Claes-Go¨ran Lo¨fdahl and Martyn R. Partridge[19]	France, Germany, Spain, Sweden, and the United Kingdom	Cross- sectional, qualitative	Patients' comprehension, recognition, emotional burdenand experience of exacerbations of COPD	Exacerbations appear to have a major impacton patient well-being. Patients with repeated exacerbations have a poor comprehension ofthe term exacerbation.
Takashi Hajiro, MD; Koichi Nishimura, MD; Mitsuhiro Tsukino, MD; Akihiko Ikeda, MD; Toru Oga, MD; and Takateru Izumi, MD. [61]	Japan	ectionalstudy	Comparison of the Level of Dyspnea Vs Disease Severity in Indicating theHealth-Related Quality of Life	Patients with severedyspnea had considerably lower HRQoL.
Randi Andenæs RN CandNursSci,Mary H. Kalfoss RN DrPH,Astrid Wahl PhD RN[25]	Oslo	tudinalstudy	Effect of disease factors and health status on perceived quality of life	The influence of psychological discomfort on one'squality of life is significant.
Déborah Fuchs- Climent, Daniel Le Gallais Alain Varray, Jacques Desplan, Marielle Cadopi, Christian G. Préfaut [62]	France	Cross-sectional	Relationships between QOL andthe clinical state, pre- and post- rehabilitation	QOL was unrelated tothe clinical condition of COPD patients as measured by a generic questionnaire.
J G van Manen,PJEBindels, F W Dekker, C J IJzermans, J S van der Zee, E Schadé [77]	Netherland	Cross-sectional	Risk of depressionin COPD patients	Patients with severe COPD are more likelyto get depressed.
Francisco Javier Álvarez-Gutiérrez,	Spain	Cross-sectional survey	Impact of chronic obstructive	Sport and leisure, regular physical
Marc Miravitlles, Miriam Calle, ElenaGobartt, Francisco López, Antonio Martín, and the EIME Study Group			pulmonary disease(COPD) on activities of dailyliving	Exercise, and sex life were the most affectedactivities.

Table 2 Previous findings about COPD knowledge and awareness

CONCLUSION

Based on the results of our study, the level of basic disease knowledge was very low in patients with COPD. Aside from a lack of knowledge about COPD, it was evident that the disease had a significant physical and psychological impact on individuals. COPD patients are very symptomatic and faced significant difficulties in their daily lives as a result of their condition. Clinical symptoms and psychiatric impact of COPD was major contributor in worsening HRQoL of peopleaffected. In addition to psychological evaluation, psychiatrist consultation should be provided to allow for the early diagnosis and treatment of superimposed mental symptoms that may aggravate COPD and negatively impact QOL. The knowledge of COPD was found to correlate with overall health-related quality of life. Health education that improves COPD patients' disease understanding may thus be required to assist improve their health-related quality of life.

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Limitations of the Study

The limitations of the present study should be acknowledged, including the cross-sectional nature and convenience sampling design for data collection. The findings of these studies are of a single district that limits generalization of results. The study sample may not represent people with undiagnosed or individuals who do not have access to health care because we recruited only adult participants from outpatient respiratory clinics. Finally, because there are no precise criteria for evaluating knowledge level based on the entire BCKQ score range, the scores cannot be used to categories the participants' knowledge levels (good, fair, or bad) and are only effective for estimating knowledge level by score.

Suggestions and Recommendations

Current study outcomes should be used to inspire the development of future COPD management programmes aimed at enhancing disease understanding and HRQoL in COPD patients. Improving public knowledge and awareness will lead to early detection of the disease, leading to better patient health outcome; morbidity and mortality rates will be reduced, and national disease burden will be altered in an advantageous direction. When evaluating COPD patients, the same consideration should be given to QOL measurement as it does to the pulmonary function test. A tailored written action plan that includes avoiding aggravating factors, monitoring or managing increasing symptoms, dyspnea and energy-conservation techniques may be effective.

Overall, our study fully explored the current state of COPD-related knowledge and HRQoL, concluding that patient's knowledge of COPD was low. This study may serve as a useful reminder of the need to increase COPD patients' knowledge of the disease.

Institutional Review Board Statement:

The study was approved by the Institutional Advanced Studies and Research Board, University of Sargodha, Punjab, Pakistan (Ref No. SU/Pharm- 909/21; 11 October 2021). The research committee of the hospital priorly approved our application to conduct research in hospital to start our data collection. This study did not require clearance by an ethics board because it did not include human or animal subject trial.

REFERENCE

1. Britton, M.J.R.m., The burden of COPD in the UK: results from the Confronting COPD survey. Respiratory medicine, 2003. 97: p. S71-S79.

2. Agusti, A., et al., Characterisation of COPD heterogeneity in the ECLIPSE cohort. respiratory research, 2010. 11(1): p. 1-14.

3. Wedzicha, J. The heterogeneity of chronic obstructive pulmonary disease. 2000 [cited 2021September25,2021]; Available from: https://thorax.bmj.com/content/55/8/631.sho

JPUMHS

rt.

4. Agusti, A.J.R.m., COPD, a multicomponent disease: implications for management. respiratory medicine, 2005. 99(6): p. 670-682.

5. Bhatta, L., et al., GOLD Classifications, COPD Hospitalization, and All-Cause Mortality in Chronic Obstructive Pulmonary Disease: The HUNT Study. International journal of chronic obstructive pulmonary disease, 2020. 15: p. 225.

6. Agusti, A. and J.J.J.o.t.d. Zhang, Chronic obstructive pulmonary disease at the beginning of the XXI Century. Journal of thoracic disease, 2019. 11(11): p. E210.

7. Antuni, J.D. and P.J.J.C.O.P.D.J.o.t.C.F. Barnes, Evaluation of individuals at risk for COPD: beyond the scope of the global initiative for chronic obstructive lung disease.
Chronic Obstructive Pulmonary Diseases: Journal of the COPD Foundation, 2016. 3(3): p.653.

8. Djalalinia, S., et al., Prevalence and years lived with disability of 310 diseases and injuriesin Iran and its neighboring countries, 1990-2015: findings from global burden of disease study 2015. Arch Iran Med, 2017. 20(7): p. 392-402.

9. Vos, T., et al., Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet, 2012. 380(9859): p. 2163-2196.

10. Løkke, A., et al., Economic Burden of COPD by Disease Severity–A Nationwide Cohort Study in Denmark. International Journal of Chronic Obstructive Pulmonary Disease, 2021. 16: p. 603.

11. Burney, P.G., et al., Global and regional trends in COPD mortality, 1990–2010. European Respiratory Journal, 2015. 45(5): p. 1239-1247.

12. Lopez, A.D., et al., Chronic obstructive pulmonary disease: current burden and future projections. European Respiratory Journal, 2006. 27(2): p. 397-412.

13. Tageldin, M.A., et al., Distribution of COPD-related symptoms in the Middle East and North Africa: results of the BREATHE study. Respiratory medicine, 2012. 106: p. S25-S32.

14. Sultana, T., et al., Epidemiological estimates of Respiratory diseases in the hospital population, Faisalabad, Pakistan. Brazilian Archives of Biology and Technology, 2017. 60.

15. Yang, H., et al., Disease knowledge and self-management behavior of COPD patients in China. Medicine, 2019. 98(8).

16. López-Campos, J.L., W. Tan, and J.B.J.R. Soriano, Global burden of COPD. Respirology,2016. 21(1): p. 14-23.

17. Xie, L., et al., Assessment of knowledge, attitude, and practice towards pulmonary rehabilitation among COPD patients: A multicenter and cross-sectional survey in China.Respiratory Medicine, 2020. 174: p. 106198.

18. Saleem, S., et al., Clinician's Perspective on the Management of Asthma and Chronic Obstructive Pulmonary Disease (COPD) Care at Primary Health Care Settings in Pakistan; Context Analysis. a review of comparative effectiveness research. Drugs, 2014:p. 2237-2244.

19. Kessler, R., et al., Patient understanding, detection, and experience of COPD exacerbations: an observational, interview-based study. Chest, 2006. 130(1): p. 133-142.

20. Thakrar, R., et al., Awareness in patients with COPD about the disease and pulmonary rehabilitation: A survey. Lung India: Official Organ of Indian Chest Society, 2014. 31(2): p. 134.

21. Scott, A.S., et al., Patient knowledge in chronic obstructive pulmonary disease: back to basics. COPD: Journal of Chronic Obstructive Pulmonary Disease, 2011. 8(5): p. 375-379.

22. Meszaros, A., et al., Evaluation of asthma knowledge and quality of life in Hungarian asthmatics. Allergy, 2003. 58(7): p. 624-628.

23. Ahmed, M.S., A. Neyaz, and A.N.J.L.I.o.o.o.I.C.S. Aslami, Health-related quality of life of chronic obstructive pulmonary disease patients: Results from a community based cross- sectional study in Aligarh, Uttar Pradesh, India. Lung India: official organ of Indian ChestSociety, 2016. 33(2): p. 148.

24. Roche, N., N.H. Chavannes, and M.J.R.R. Miravitlles, COPD symptoms in the morning: impact, evaluation and management. Respiratory Research, 2013. 14(1): p. 1-8.

25. Andenæs, R., M.H. Kalfoss, and A.J.J.o.A.N. Wahl, Psychological distress and quality of life in hospitalized patients with chronic obstructive pulmonary disease. Journal of Advanced Nursing, 2004. 46(5): p. 523-530.

26. Rennard, S., et al., Impact of COPD in North America and Europe in 2000: subjects' perspective of Confronting COPD International Survey. European Respiratory

JPUMHS

Journal, 2002. 20(4): p. 799-805.

27. Eiser, N., et al., Effect of treating depression on quality-of-life and exercise tolerance in severe COPD. COPD: Journal of Chronic Obstructive Pulmonary Disease, 2005. 2(2): p. 233-241.

28. Sexton, D.L., et al., Living with a chronic illness The experience of women with chronic obstructive pulmonary disease (COPD). Western Journal of Nursing Research, 1988. 10(1): p. 26-44.

29. Sabzwari, S.R.J.J.o.P.M.A., Health literacy in Pakistan: Exploring new ways of addressing an old challenge. Journal of Pakistan Medical Association, 2017. 67(12): p. 1901.

30. Ferrer, M., et al., Chronic obstructive pulmonary disease stage and health-related quality of life. 1997. 127(12): p. 1072-1079.

31. Stellefson, M., et al., Association between health literacy, electronic health literacy, disease-specific knowledge, and health-related quality of life among adults with chronic obstructive pulmonary disease: cross-sectional study. Journal of medical Internet research, 2019. 21(6): p. e12165.

32. Quaderi, S. and J. Hurst, The unmet global burden of COPD. Global health, epidemiology, 2018. 3.

33. Postma, S. and A.J.R.M. Kerstjens, Epidemiology and natural history of chronic obstructive pulmonary disease. Respiratory medicine, 2003: p. 1109-1120.

34. Chapman, K.R., D.P. Tashkin, and D.J.J.C. Pye, Gender bias in the diagnosis of COPD. Chest, 2001. 119(6): p. 1691-1695.

35. Woldeamanuel, G.G., A.B. Mingude, and T.G.J.B.P.M. Geta, Prevalence of chronic obstructive pulmonary disease (COPD) and its associated factors among adults in Abeshge District, Ethiopia: a cross sectional study. BMC Pulmonary Medicine, 2019. 19(1): p. 1-9.

36. Raherison, C. and P.J.E.R.R. Girodet, Epidemiology of COPD. European Respiratory Review, 2009. 18(114): p. 213-221.

37. Mannino, D.M. and A.S.J.T.L. Buist, Global burden of COPD: risk factors, prevalence, and future trends. The Lancet, 2007. 370(9589): p. 765-773.

38. De Marco, R., et al., An international survey of chronic obstructive pulmonary disease in young adults according to GOLD stages. Thorax, 2004. 59(2): p. 120-125.

39. Lindberg, A., et al., Ten-year cumulative incidence of COPD and risk factors for incident disease in a symptomatic cohort. Chest, 2005. 127(5): p. 1544-1552.

40. Baiardini, I., et al., Disease awareness in patients with COPD: measurement and extent. International Journal of Chronic Obstructive Pulmonary Disease, 2019. 14: p. 1.

41. Monteiro, M.C.d.C.A., et al., Knowledge about COPD among users of primary health care services. International Journal of Chronic Obstructive Pulmonary Disease, 2015. 10: p. 1.

42. Catotti, V., et al., The efficacy of COPD patients education: A paired matched case-control study. European Respiratory Journal, 2014. 44(Suppl 58).

43. Choi, J.Y., H.I.C. Chung, and G. Han, Patient outcomes according to COPD action plan adherence. Journal of clinical nursing, 2014. 23(5-6): p. 883-891.

44. Dal Negro, R., M. Guerriero, and P. Turco, COPD and Public Opinion: Results of a Survey in the General Population. Journal of Pulmonary Respiratory Medicine 2015. 5(255): p. 2.

45. Soriano, J.B., et al., The general public's knowledge of chronic obstructive pulmonary disease and its determinants: current situation and recent changes. Archivos de Bronconeumologia, 2012. 48(9): p. 308-315.

46. White, R., et al., Bristol COPD Knowledge Questionnaire (BCKQ): testing what we teach patients about COPD. Chronic respiratory disease, 2006. 3(3): p. 123-131.

47. Monteiro, M.C.d.C.A., et al., Knowledge about COPD among users of primary health care services. International journal of chronic obstructive pulmonary disease, 2015. 10: p. 1.

48. Wong, C.K. and W. Yu, Correlates of disease-specific knowledge in Chinese patients with COPD. International journal of chronic obstructive pulmonary disease, 2016. 11: p. 2221.

49. Stoilkova, A., D.J. Janssen, and E.F. Wouters, Educational programmes in COPD management interventions: a systematic review. Respiratory medicine, 2013. 107(11): p. 1637-1650.

50. Kesänen, J., et al., Knowledge tests in patient education: a systematic review. Nursing health sciences 2014. 16(2): p. 262-273.

51. Ivziku, D., et al., Patients and caregivers' knowledge of chronic obstructive pulmonary disease. Professioni infermieristiche, 2018. 71(1).

52. Vestbo, J., et al., Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. American

JPUMHS

journal of respiratory and critical care medicine, 2013. 187(4): p. 347-365.

53. Henoch, I., C.-G. Löfdahl, and A. Ekberg-Jansson, Influences of patient education on exacerbations and hospital admissions in patients with COPD–a longitudinal national register study. European clinical respiratory journal, 2018. 5(1): p. 1500073.

54. Collinsworth, A.W., et al., The impact of patient education and shared decision making on hospital readmissions for COPD. International journal of chronic obstructive pulmonary disease, 2018. 13: p. 1325.

55. Ahmed, M.S., A. Neyaz, and A.N. Aslami, Health-related quality of life of chronic obstructive pulmonary disease patients: Results from a community based cross-sectional study in Aligarh, Uttar Pradesh, India. Lung India: official organ of Indian Chest Society,2016. 33(2): p. 148.

56. Engström, C., et al., Health-related quality of life in COPD: why both disease-specific and generic measures should be used. European Respiratory Journal, 2001. 18(1): p. 69-76.

57. Hesselink, A.E., et al., What predicts change in pulmonary function and quality of life in asthma or COPD? Journal of Asthma, 2006. 43(7): p. 513-519.

58. Tsiligianni, I., et al., Factors that influence disease-specific quality of life or health status in patients with COPD: a review and meta-analysis of Pearson correlations. Primary care respiratory journal: journal of the General Practice Airways Group, 2011. 20(3): p. 257-268.

59. Hajiro, T., et al., Stages of disease severity and factors that affect the health status of patients with chronic obstructive pulmonary disease. Respiratory Medicine, 2000. 94(9): p. 841-846.

60. Miravitlles, M., et al., Patient's perception of exacerbations of COPD-the perceive study.Respiratory Medicine: COPD Update, 2006. 2(3): p. 113.

61. Hajiro, T., et al., A comparison of the level of dyspnea vs disease severity in indicating the health-related quality of life of patients with COPD. Chest, 1999. 116(6): p. 1632-1637.

62. Fuchs-Climent, D., et al., Factor analysis of quality of life, dyspnea, and physiologic variables in patients with chronic obstructive pulmonary disease before and after rehabilitation. American journal of physical medicine & rehabilitation, 2001. 80(2): p. 113-120.

63. Álvarez-Gutiérrez, F.J., et al., Impact of chronic obstructive pulmonary disease on activities of daily living: results of the multicenter EIME study. Archivos de Bronconeumología ((English Edition)), 2007. 43(2): p. 64-72.

64. Stellefson, M., et al., Association between health literacy, electronic health literacy, disease-specific knowledge, and health-related quality of life among adults with chronic obstructive pulmonary disease: cross-sectional study. Journal of medical Internet research,2019. 21(6): p. e12165.

65. Gupta, A., et al., Assessment of knowledge, attitude, and behavior about the disease process and physiotherapy management in patients with chronic obstructive pulmonary disease: A qualitative study. Journal of education health promotion 2019. 8.

66. Pumar, M.I., et al., Anxiety and depression—Important psychological comorbidities of COPD. Journal of thoracic disease, 2014. 6(11): p. 1615.

67. Regvat, J., et al., Anxiety and depression during hospital treatment of exacerbation of chronic obstructive pulmonary disease. Journal of International Medical Research, 2011. 39(3): p. 1028-1038.

68. Gudmundsson, G., et al., Depression, anxiety and health status after hospitalisation for COPD: a multicentre study in the Nordic countries. Respiratory medicine, 2006. 100(1): p. 87-93.

69. Ng, T.-P., et al., Depressive symptoms and chronic obstructive pulmonary disease: effect on mortality, hospital readmission, symptom burden, functional status, and quality of life. Archives of internal medicine, 2007. 167(1): p. 60-67.

70. Hill, K., et al., Anxiety and depression in end-stage COPD. European respiratory journal, 2008. 31(3): p. 667-677.

71. Arne, M., et al., Factors associated with good self-rated health and quality of life in subjects with self-reported COPD. International journal of chronic obstructive pulmonary disease, 2011. 6: p. 511.

72. Miravitlles, M., et al., Factors determining the quality of life of patients with COPD in primary care. Therapeutic advances in respiratory disease, 2007. 1(2): p. 85-92.

73. Partridge, M.R., R.W. Dal Negro, and D.J.P.C.R.J. Olivieri, Understanding patients with asthma and COPD: insights from a European study. Attitudes towards regular therapy, 2011. 20(3): p. 315-323.

74. Partridge, M.R., R.W. Dal Negro, and D.J.P.C.R.J. Olivieri, Understanding patients with asthma and COPD: insights from a European study. Primary Care Respiratory Journal, 2011. 20(3): p. 315-323.

JPUMHS

75. Gazmararian, J.A., et al., Health literacy and knowledge of chronic disease. Patient education and counseling, 2003. 51(3): p. 267-275.

76. Uzel, F.I., et al., A Basic Question: Are Patients with Chronic Obstructive Pulmonary Disease Aware of Their Disease? Turkish thoracic journal, 2017. 18(4): p. 114.Van Manen, J., et al., Risk of depression in patients with chronic obstructive pulmonary disease and its determinants. Thorax, 2002. 57(5): p. 412-416.

77. Álvarez-Gutiérrez, F.J., et al., Impact of chronic obstructive pulmonary disease on activities of daily living: results of the multicenter EIME study. Archivos de Bronconeumología, 2007. 43(2): p. 64-72.