

Correlates of Chronic Obstructive Pulmonary Disease (COPD) Patients' Quality of Life in Selected Hospitals of Shandong, China

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Abstract: Chronic Obstructive Pulmonary Disease is the most common chronic disease of the respiratory system, with high mortality and difficult to cure. With the advancement of medicine, people's attention to diseases is no longer limited to relieving the patient's current condition, but also advocates improving the quality of life of patients as much as possible. This paper decided to study the relationship between socio-clinico demographic profile, and quality of life of Chronic Obstructive Pulmonary Disease patients, aiming to provide a basis for formulating nursing measures that can improve the quality of life of Chronic Obstructive Pulmonary Disease patients. This study was carried out in Shandong Province, China. Researchers selected 200 Chronic Obstructive Pulmonary Disease patients who met the inclusion and exclusion criteria, and collected information using a questionnaire adapted from the St. George's Respiratory Questionnaire. Regression analysis was used to determine statistical significance. The results showed a significant correlation between COPD patients' age, monthly income, smoking pack-years, comorbidities, and their quality of life.

Keywords: Chronic Obstructive Pulmonary Disease, quality of life, socio-clinico demographic profile, the St. George's Respiratory Questionnaire

1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a common disease of the respiratory system characterized by progressive, incompletely reversible respiratory airflow limitation [1]. Globally, COPD is the main cause of both chronic morbidity and mortality [2]. As a chronic disease, COPD has the characteristics of a long duration, frequent hospitalization, and is difficult to cure, the quality of life (QOL) of COPD patients is often difficult to guarantee. Based on the above characteristics, more and more scholars have investigated the QOL of COPD patients.

The QOL of COPD patients is significantly reduced compared with healthy people. Previous studies have shown that this may be related to the patient's age, sex, income and other factors [3]. Qiao Shanshan [4] found that patients with better QOL have higher medication compliance when studying the impact of health education on the QOL of patients with COPD. The study by Rosińczuk et al [5] confirmed that clinical factors such as treatment and complications are related to QOL in COPD patients.

The researchers reviewed the literature in the past five years and found that there are not many literatures in China that comprehensively explore the relationship between socio-clinico demographic factors and QOL in COPD patients. It was therefore decided to collect socio-clinico demographic profiles of the participants, such as age, gender, highest educational level, monthly income, pack-years of smoking, type of COPD, medication compliance, and comorbidities. And discuss the relationship between socio-clinical demographic factors and QOL in COPD patients. This research could be the basis for patient-centered care aimed at improving the QOL of patients with COPD.

2. Methods

2.1. Study Design

The study is correlational research by regression. A correlative non-experimental type of quantitative research design that investigates the relationship between multiple variables without the researcher

controlling or manipulating any of them.

2.2. Study Participants

2.2.1. Sample Size and Sampling

The study will use simple random sampling to recruit 200 patients who meet the inclusion and exclusion criteria from two hospital in Shandong Province.

2.2.2. Inclusion and Exclusion Criteria

Investigators will recruit patients aged 18 to 75 with COPD for at least six months in the medical inpatient wards of selected hospitals. Participants must have the ability and equipment to access the electronic questionnaire and informed consent form as the questionnaire will be distributed electronically. Patients with hearing or speech impairments will be excluded. Prisoners or special groups with political disputes are treated in special hospitals by law and are therefore not included.

2.3. Research Instruments

This study mainly used questionnaires as a tool. The researcher set up 9 questions to collect the basic socio-clinical demographic profile of the patients.

Respondents' QOL was measured using the St. George's Respiratory Questionnaire (SGRQ) proposed by Jones et al [6] in 1991, which was originally designed to measure health impairment in COPD patients and was suitable for this study. The type of measurement used in the SGRQ is categorical and ordinal. The items are structured as statements or questions related to symptoms, activities, and the impact of respiratory conditions on daily life. The response options are typically in the form of Likert scales, where respondents indicate the degree of agreement or disagreement with each statement. The Likert scale responses are then assigned numerical values, and the weighted answers contribute to the calculation of the overall score.

El Rhazi et al [7] used Cronbach's alpha reliability coefficient to evaluate the internal consistency of symptoms, activity, and impact components, verifying the construct validity and reliability of SGRQ. Since the study was conducted in Shandong Province, China, the questionnaire was distributed electronically using the Chinese version. The translated questionnaire has been verified by local linguists.

2.4. Statistical Analysis of Data

The R studio version 4.2.1 software was used to analyze the results for descriptive statistics which includes, frequency percentage distribution, mean score, and standard deviation. Inferential statistics such as multivariable linear regression analysis was also employed to examine the association and predictive factors of multiple identified factors with COPD patients' QOL.

3. Results

3.1. Socio-Clinico Demographic Profile in Respondens

Two-hundred COPD patients participated in the study. **Table 1** shows the demographic distribution of the respondents. Most of the participants were aged between 60-75 years old (49.5%), and more male (72.0%) than female. A larger number of participants (35.5%) have only got the primary level. According to the per capita disposable income of residents in Shandong Province, the average monthly income of residents is 3,130 yuan, and the minimum per capita monthly income is 2,200 yuan. Almost half of the participants (47.0%) earn less than 2,200 yuan.

Table 2 describes the clinical profiles of the respondents. Among respondents who are currently smoking, there were 5.5% of respondents who smoked for more than 30 pack-years. Among who are currently non-smokers, only 5% of respondents have never smoked. There were twice as many respondents had chronic bronchitis as emphysema (68.0%). The vast majority of respondents have missed check-ups 3 to 4 times in the past 3 months (35.5%), and half of the participants (50.0%) took their COPD medications on time in the past 3 months. There were 13.5% of respondents who suffer from 3 or more comorbidities.

Table 1: Demographic profile of COPD patients.

Variable		Frequency	Percent (%)
Age	≤30	8	4.0
	31-45	25	12.5
	46-60	68	34.0
	61-75	99	49.5
Sex	Female	56	28.0
	Male	144	72.0
Highest educational attainment	Never been to school	52	26.0
	Primary Level	71	35.5
	Secondary Level	47	23.5
	Bachelor's degree	14	7.0
	Master's degree	9	4.5
	Doctoral Degree	7	3.5
Monthly income	≤2200	94	47.0
	2201-3130	44	22.0
	3131-5000	38	19.0
	>5000	24	12.0

Table 2: Clinical profile of COPD patients.

Variable		Frequency	Percent (%)
Smoking pack-years	Currently smoking		
	1-10year	4	2.0
	11-20year	15	7.5
	21-30year	18	9.0
	>30year	11	5.5
	Currently not smoking		
	0	10	5.0
	1-10year	48	24.0
	11-20year	58	29.0
	21-30year	15	7.5
	>30year	21	10.5
Type of COPD	Doctoral Degree	7	3.5
	Emphysema	64	32.0
	Chronic bronchitis	136	68.0
Number of missed COPD check-ups	Never	55	27.5
	1 or 2 times within 3 months	40	20.0
	3 or 4 times within 3 months	71	35.5
	More than 4 times within 3 months	34	17.0
Number of missed COPD medications	Never	100	50.0
	1 or 2 times within 3 months	55	27.5
	3 or 4 times within 3 months	31	15.5
	More than 4 times within 3 months	14	7.0
Complications	0	57	28.5
	1	75	37.5
	2	41	20.5
	≥3	27	13.5

3.2. SGRQ Scores of Respondents

Table 3: COPD patients' scores in SGRQ components.

SGRQ	Mean	SD
Symptoms component	61.00	20.01
Activity component	51.51	17.86
Impacts component	53.17	14.37
SGRQ total scores	53.97	14.17

As shown in **Table 3**, the component with the highest mean score was the symptoms component

(Mn=61.00, SD=20.01), followed by the impacts component (Mn=53.17, SD=14.37). Lastly, the patients have the lowest score on activity component, with a mean of 51.51 (SD=17.86). The patient's overall average SGRQ score was 53.97, which corresponds to a general deviation in the patient's QOL.

3.3. Regression Analysis between Socio-Clinico Demographic Profile and SGRQ Scores

Multiple linear regression analysis was performed using SGRQ score as the dependent variable and various demographic characteristics and clinical characteristics as independent variables. The results are shown in **Table 4**. The model variance analysis test yielded a statistically significant result with an F-statistic of 27.51 and a p-value less than 0.001. This indicates that the regression model is statistically significant, providing evidence of a substantial linear relationship between the independent variables and the dependent variable.

Table 4: Regression analysis between socio-clinico demographic profile and SGRQ scores.

Variable	Estimate	Std. Error	95% CI LL	95% CI UL	Sig.
(Intercept)	23.36	3.341	16.76	29.95	<0.001
Age	0.35	0.049	0.25	0.45	<0.001
Sex: Male	0.46	1.517	-2.53	3.45	0.761
Highest Educational Attainment: Primary level	1.67	1.553	-1.39	4.73	0.283
Highest Educational Attainment: Secondary level	1.80	1.834	-1.82	5.41	0.329
Highest Educational Attainment: Bachelor's degree	0.56	3.143	-5.65	6.76	0.860
Highest Educational Attainment: Master's degree	0.70	3.134	-5.48	6.89	0.823
Highest Educational Attainment: Doctoral degree	-3.01	3.479	-9.87	3.85	0.388
Monthly Income Group: 2201-3130	-2.04	1.575	-5.15	1.07	0.197
Monthly Income Group: 3131-5000	-3.89	1.695	-7.24	-0.55	0.023
Monthly Income Group: >5000	-3.67	2.098	-7.81	0.47	0.082
Smoking pack-years	0.23	0.057	0.12	0.34	<0.001
Type of COPD: Chronic Bronchitis	1.10	1.291	-1.44	3.65	0.394
Number of Missed COPD check-ups	-0.32	0.327	-0.96	0.33	0.332
Number of Missed COPD medications	-0.10	0.386	-0.86	0.66	0.794
Number of Comorbidities: 0	(ref)				
Number of Comorbidities: 1	3.02	1.469	0.12	5.92	0.042
Number of Comorbidities: 2	14.87	1.729	11.46	18.28	<0.001
Number of Comorbidities: 3 or more	20.65	1.975	16.76	24.55	<0.001
R-squared: 0.7198					
Adjusted R-squared: 0.6937					
F-statistic: 27.51					
P-value: <0.001					

Age has a positive and significant effect on the SGRQ score of the respondents, that is a unit increase in age increases the SGRQ score by 0.35, while holding other variables as constant. In essence, the trend suggests that as individuals age, there is a decline in their QOL, as reflected by the SGRQ scores.

Males have higher SGRQ score (Sex: Male = 0.46, p-value=0.761) as compared to females, it suggests that males have poorer QOL as compared to females, however it appears to be insignificant.

Respondents with Primary level (Estimate=1.67, p-value=0.283), Secondary level (Estimate=1.79, p-value=0.329), Bachelor's degree (Estimate=0.55, p-value=0.860), Master's degree (Estimate=0.70, p-value=0.823) have higher SGRQ score and that respondents with Doctoral degree (Estimate=-3.00, p-value=0.388) have lower SGRQ score, all of which as compared to those respondents who have never been in school. However, these comparisons were found to be insignificant.

Respondents with estimated monthly income group of around 2,201-3,130 (Estimate=-2.04, p-value=0.197) yuan per month, income group of around 3,131-5,000 (Estimate=-3.89, p-value=0.022) yuan per month, and income group of 5,000 and above (Estimate=-3.67, p-value=0.082) yuan per month, have lower SGRQ score, as compared to those respondents who have estimated monthly income group of less than 2,200 yuan per month. The result is only significant for the income group of around 3,131-5,000 yuan per month.

The effect of smoking pack-years has a positive and significant effect on the SGRQ score of the respondents. That is, a unit increase in packed years increases the SGRQ score by 0.23, while holding other variables as constant.

Respondents with Chronic Bronchitis type of COPD have higher SGRQ score (Type of COPD: Chronic Bronchitis=1.10, p-value=0.393) as compared to respondents with Emphysema type of COPD, however it appears to be insignificant.

The effect of the number of missed COPD check-ups has a negative but insignificant effect on the SGRQ score of the respondents. That is, a unit increase in the number of missed COPD check-ups decreases the SGRQ score by 0.31, while holding other variables as constant. The effect of the number of missed COPD medications has a negative but insignificant effect on the SGRQ score of the respondents. That is, a unit increase in the number of missed COPD medications decreases the SGRQ score by 0.10, while holding other variables as constant.

Respondents with 1 (Estimate=3.02, p-value=0.042), 2 (Estimate=14.87, p-value<0.001), and 3 or more (Estimate=20.65, p-value<0.001) co-morbidities has higher SGRQ score as compared to respondents with no comorbidities. Across all comparisons, the results turned out to be significant.

4. Discussion

The recently published China Pulmonary Health (CPH) study made statistics on the demographic characteristics of COPD patients from 10 regions in China, the prevalence of COPD in people over 40 years old is much higher than that in people aged 20-39, and are mainly male [8]. According to the results of regression analysis, it is believed that there is a significant correlation between the age of COPD patients and their QOL in the sample of this study. Rosińczuk et al [5] found that the age and of COPD patients were significantly related to their QOL, patients' QOL worsens as they get older.

A previous literature showed that COPD patients in developing countries are mainly male, and the prevalence of COPD in men and women in developed countries is similar, but no significant correlation was found between gender and QOL of COPD [9]. In this study, males had worse QOL than females, but this was not significant.

A study shows that more than 80% of COPD patients have only received education below secondary level, and most have no remuneration from work. Bak-Drabik [10] concluded that educational, income are significantly related to QOL for COPD patients. However, there are also some studies that suggest that education level has no significant impact on QOL [11]. In this study, patients with a doctorate degree had a better QOL than those with a bachelor's degree or less, which was not significant.

Fernández-García et al [12] analyzed that more than half of the patients were from low-income groups. Lim et al [13] validates that COPD patients with significant symptoms have lower incomes. It is more difficult for patients with low monthly income to obtain timely treatment, or they may not continue treatment due to the cost, thus reducing QOL.

There is growing evidence that tobacco exposure is documented as an important risk factor for COPD [14]. In the study by Nakken et al [15], less than 20% of patients diagnosed with COPD were still smoking. Smoking is the main risk factor for COPD [16]. And it negatively affects health-related QOL in COPD patients [11]. Zamzam et al [17] used SGRQ-C to evaluate the QOL of COPD patients and believed that a higher smoking index would affect the QOL of COPD patients.

Chronic bronchitis and emphysema are two separate but often related disease processes of COPD [18]. In a study on chronic airway disease from China, the number of patients diagnosed with chronic bronchitis was approximately five times that of emphysema patients [19].

At least 65% of patients with chronic airflow in China Blocked subjects remain undiagnosed [20]. We reviewed the literature in the past ten years and found no studies that could clarify the relationship between check-ups frequency and QOL of COPD patients. Results from this paper suggest that the effect of the number of missed COPD check-ups has a negative but insignificant effect on the QOL score of the respondents.

Medication compliance in COPD patients has been reported to range from 0.3% to 68%, depending on the type and combination of medications [21]. Suboptimal treatment or nonadherence may result in limited effectiveness of medication, leading to poor health outcomes [22]. Patients who take medications on time have relatively better QOL [23].

The study by Sundh et al [24] confirmed that heart disease, depression, and abnormal weight are independently associated with reduced QOL in patients with COPD. In another study by Putcha et al [25], four comorbidities (congestive heart failure, arthritis, diabetes, prostate disease) were independently associated with patients' QOL. Patients with comorbidities have worse QOL than patients without comorbidities, especially when patients have two, three or more comorbidities [26].

5. Conclusion

This study was mainly conducted to explore the relationship between socio-clinico demographic factors and QOL of COPD patients in Shandong Province, China. Most of the COPD patients are over 45 years old, and more male than female. Most patients have lower education and income. In terms of clinical factors, most patients have smoked for more than 30 pack-years. Fortunately, most of them have quit smoking now. More COPD patients in Shandong Province suffer from chronic bronchitis replaced emphysema. About half of the patients have missed taking medicine or examinations in the past. And many patients even have 2-3 or more comorbidities.

The SGRQ report shows that the selected patients have moderate to poor QOL. The study confirmed that patients' age, monthly income, smoking pack-years, and number of comorbidities are all significantly related to their QOL in Shandong Province. Specifically, the older COPD patients are, the worse their QOL is, and the lower their monthly income, the worse their QOL is. The greater the number of pack-years of smoking, the worse the patient's QOL, and the greater the number of comorbidities the patient has, the worse the patient's QOL.

In order to correctly interpret the results of this study, some limitations should be acknowledged. Shandong Province is China's most populous province, since the sample size is limited, the research results may deviate from reality. The results show that the number of missed check-ups is positively correlated with the patient's QOL, that's counterintuitive and requires further research in the future although not significant. Few papers have examined whether second-hand smoke can cause or worsen COPD. The difficulty of quantifying second-hand smoke is a major problem that is hoped to be solved in the future. Additionally, QOL was obtained as a self-reported outcome, which means that everyday sensitivities such as stress or bad mood may influence answers because of the retrospective nature of the questions.

Based on the conclusions of this study, medical institutions in Shandong Province will have the opportunity to make better medical and nursing interventions for patients with different social and clinical demographic characteristics, thereby bringing more benefits to patients.

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