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Disease knowledge and self-management behavior of COPD patients in China

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Abstract

This study aims to investigate the disease knowledge and self-management behavior of patients with chronic obstructive pulmonary disease (COPD) in the respiratory ward of a tertiary hospital in China, and analyze the relationship between these.

A total of 360 COPD patients were surveyed using the internationally validated COPD Questionnaire (COPD-Q), the COPD Patients' Self-Management Behavior Scale and a general sociodemographic questionnaire, and 346 valid responses were obtained.

The results revealed that the surveyed COPD patients scored an average of 4.90 ± 2.50 points (maximal of 13 points) on the COPD-Q and 117.23 ± 20.56 points on the COPD Self-Management Behavior Scale, in which 86.1% of COPD patients were classified as having low to medium levels of self-management behavior. Pearson correlation analysis revealed that the total points on the COPD Self-Management Behavior Scale, symptom management, daily life management, emotional management and information management were all positively correlated to the disease knowledge of COPD ($P < .01$). In addition to COPD knowledge, the multiple regression analysis revealed that age, marital status and place of residence could also affect self-management behavior.

The level of disease knowledge and self-management behaviors of patients with COPD is rather low in China. COPD knowledge level was found to correlate with the level of self-management behavior. Health education that enhances the disease knowledge of COPD patients might thereby be necessary to help improve self-management behavior.

Abbreviations: COPD = chronic obstructive pulmonary disease, COPD-Q = COPD questionnaire, WHO = World Health Organization.

Keywords: COPD, disease knowledge, self-management

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a common condition detrimental to human health, and negatively affects both the life expectancy and quality of life of patients. Over 90% of deaths due to COPD occur in countries with low-to-middle income levels. The World Health Organization (WHO) has estimated that COPD will become the third leading cause of death worldwide by 2020.[1] In China, the overall prevalence of COPD is estimated to be 8.2%, and major risk factors besides genetic susceptibility were found to be residence in rural areas, advanced age, active smoking, low body mass index, low education level, poor ventilation in the kitchen and occupational exposure to dusts or biomass fuels.[2]

Despite the advances in modern medicine, COPD remains as an irreversible disease that cannot be cured. Once diagnosed, patients would need life-long treatment and daily management.

Especially during the stable period, the patient's self-management behavior would be crucial for halting the progression of the disease and preventing exacerbations and hospitalizations. The socioeconomic status of COPD patients has been consistently found to be inversely correlated to disease outcome. Patients with the lowest socioeconomic status are at least twice as likely to have poor outcomes as those of the highest.[3] Therefore, it is crucial to address educational deficiency and low health literacy skills in disease management programs, since it has been shown that adequate patient education improves health-related quality of life and decreases the hospital admissions of COPD patients.[4,5] The present study utilizes the Chronic Obstructive Pulmonary Disease knowledge Questionnaire (COPD-Q) developed for low literacy patients[6] and the modified version of the Chinese-developed COPD Self-Management Scale (CSMS)[7] to determine the specific relationship between the level of disease knowledge and self-management behaviors of COPD patients in China. The results of the present study are expected to be useful in formulating more targeted health education programs that can help patients establish good self-management behaviors.

2. Methods

2.1. Study subjects

A convenience sample of 360 COPD patients from the respiratory ward of a tertiary hospital between December 2014 and July 2015 was selected. Inclusion criteria: physician-diagnosed COPD patients, according to COPD diagnosis and treatment guidelines (2013 revised edition); patients who were stable after the systemic treatment of his/her COPD and were ready for discharge the next day. Exclusion criteria: patients with GOLD stage IV disease, patients with severe co-morbidities in the heart, lungs, liver,

kidneys and nervous system, or psychiatric disorders, and patients who are unable to complete the questionnaire even with help of the investigators.

2.2. Study method

After obtaining an informed consent from both the patients and their families, the baseline clinical and sociodemographic data, and COPD disease knowledge of these patients were collected on the day before their discharge from the respiratory ward using a self-designed questionnaire and the COPD-Q,[6] respectively. At 1 month after discharge, the patient's self-management behavior outside the hospital was evaluated using the modified version of the CSMS developed by Caihong Zhang.[7] All questionnaires were filled out by the patient him-/herself or by a long-term caregiver who were under the standardized guidance of the investigators.

2.3. Study tools

The tools used in the present study included the following:

(1) Self-designed questionnaire for obtaining clinical and socio-demographic information. The contents included the patient's gender, age, education level, occupation, marital status, living status, place of residence, monthly household income level, smoking status, medical insurance, disease duration, GOLD stage, hospital admission during the past 6 months and comorbidities (cardiovascular disease, hypertension, and diabetes).
(2) COPD-Q[6] for the quantification of the COPD knowledge levels of patients. The questionnaire was internationally validated, and had a Cronbach α of 0.72. The contents include COPD risk factors, clinical manifestations, medication, oxygen therapy, prevention, and prognosis. There were 13 items in total, including 8 true statements and 5 false statements. Each statement was answered with a "Yes", "No", or "Do not know". Every correct answer was given 1 point. The possible scores ranged within 0 to 13 points. The higher the score, the higher the level of disease knowledge of the patient was.
(3) The CSMS questionnaire quantifies the self-management behavior of COPD patients.[7] The scale includes 5 domains: symptom management, daily life management, emotion management, information management, and self-efficacy. For the present study, the CSMS questionnaire was modified to only include the first 4 domains, and self-efficacy was omitted, since the present study only focused on the actual behavior of COPD patients, and not their intentions. The authors also found that items 3 and 4 in the original questionnaire, that is, Item 3, "I do not take steroids (e.g., prednisone or dexamethasone) when I feel serious shortness of breath" and Item 4, "I do not take anti-inflammatory drugs when I feel serious shortness of breath," deviates from the actual treatment strategy for COPD patients used in clinic. Therefore, this could potentially negatively affect the reliability of the symptom management part of the questionnaire. After careful consideration, the present study modified the CSMS questionnaire and deleted these 2 items. A total of 40 items of the self-management behavior questionnaire were included in the present study. These items were scored using the Likert 5-grade scoring method, and the answer choices were divided into "never, very few, sometimes, often, and

always," which gives 1 to 5 points, respectively. The possible score range was within 40 to 200 points. The score was positively correlated with the level of self-management behavior of the patient. That is, the higher the patient's score, the higher the level of self-management behavior became. The scale had a Cronbach α of 0.919. The mean and standard deviation (SD) of the scores of all study subjects were obtained. Subjects who scored greater than mean+1 SD were classified as having a high level of self-management, while subjects who scored less than mean-1 SD were classified as having a low level of self-management. Patients with a score greater than or equal to mean-1 SD and less than or equal to mean+1 SD were classified as having a medium level of self-management.

2.4. Statistics

All questionnaire data were manually evaluated by the investigators for completeness and correctness. Valid questionnaires were selected and given serial numbers. All data was entered into a database, and underwent consistency and logic checks. The original questionnaires were archived.

Descriptive statistics was carried out by expressing count data as frequency and percentage, and continuous data as mean±SD. The normal distributions of variables were confirmed using the Kolmogorov-Smirnov normality test. The relationship between COPD knowledge and self-management behavior was analyzed using Pearson correlation. Factors that affected self-management behavior were analyzed using multiple stepwise regression with the backward elimination method. $P<.05$ was considered statistically significant. SPSS 16.0 statistical software package was used for the statistical analysis of the collected data.

For the multiple regression analysis, COPD knowledge was treated as an independent variable that can potentially affect the dependent variable, which is the self-management behavior of patients. Other independent variables included sociodemographic information, such as age, gender, marital status, education level, household income, living condition, place of residence, medical insurance, GOLD stage, duration of disease, the presence of other comorbidities, and the number of hospital admissions during the past 6 months. Stepwise selection of independent variables was carried out with the backward elimination method using restraints α = 0.05 and α = 0.10.

3. Results

3.1. Sociodemographic characteristics

A total of 360 questionnaires were distributed, and 346 valid responses were collected. The valid response rate was 96.1%. Among these 346 valid responses, 71.1% (246 people) were male respondents, while 28.9% (100 people) were female respondents. The age range of these respondents was 44 to 86 years old, with a mean age of 69.76±8.68 years old. A majority of the participants had spouses (79.2%). Among these participants, 8 participants had college education or above, while 206 participants (59.54%) received elementary school education or below. Furthermore, almost all participants (95.1%) lived with their family, while only 17 participants lived alone. Approximately two-thirds (64.4%) of the participants lived in rural areas, while one-third (13.6%) of the participants lived in the city. Nearly half (45.1%) of the participants had a household monthly income below 500 CNY (156 participants). Almost all participants (98.8%) were covered

Table 1

Sociodemographic characteristics.

	Groups	Participants	Percentage (%)
Gender	Male	246	71.1
	Female	100	28.9
Age	≤59	46	13.3
	60–69	120	34.7
	70–79	131	37.9
	≥80	49	14.2
Marital status	No spouse	72	20.8
	Have spouse	274	79.2
Education level	Primary school or lower	206	59.5
	Junior high school	88	25.4
	High school	44	12.7
	College or higher	8	2.3
Living condition	Alone	17	4.9
	With family	329	95.1
Household income (monthly)	≤500	156	45.1
	501–1,500	29	8.4
	1501–3000	114	32.9
	>3000	47	13.6
Place of residence	Rural	223	64.4
	Urban	123	35.6
Medical insurance	Fully covered	3	0.9
	Partially covered	342	98.8
	No insurance	1	0.3

Table 2

Clinical characteristics.

		Number of patients	Percentage of total (%)
GOLD stage	I	106	30.6
	II	132	38.2
	III	108	31.2
Comorbidity	Yes	203	58.7
	No	143	41.3
Hospital admissions during the past 6 months	0	209	60.4
	1	116	33.5
	2	21	6.1

have been admitted to the hospital at least once. The details are presented in Table 2.

3.3. COPD knowledge

Using the COPD-Q, the COPD knowledge of the participants was measured. The scores of the participants ranged within 0 to 12 points (out of a maximal of 13 possible points), with a mean score of 4.90 ± 2.50. The details are presented in Table 3.

3.4. Self-management behavior

The range of scores obtained from the questionnaire on self-management behavior was 74 to 194 points (out of a maximal of 200 possible points), and the mean score was 117.23 ± 20.56. Participants who scored higher than mean + 1 SD (>138 points) were defined as having a high level of self-management behavior, while participants who scored lower than mean − 1 SD (<97 points) were defined as having a low level of self-management behavior. Participants with scores within 97 to 138 were defined as having a medium level of self-management behavior. Using this definition, 68.8% of participants had a medium level of self-management behavior, while 13.9% and 17.3% of participants had high and low levels of self-management behavior. The standardized score for each domain was obtained by dividing the score in that domain by the number of questions in the same domain. For all participants, the highest score was in the domain of emotional management behavior, while the lowest score was in

by medical insurance that partially reimbursed their medical expenses, 3 participants had medical insurance that reimbursed all their medical expenses, and 1 participant did not have medical insurance at all. The details are presented in Table 1.

3.2. Clinical characteristics

The average disease duration was 9.80 ± 5.98 years, with a range of 35 years to <1 year. GOLD stage II was the most common (38.2%). Patients with very GOLD stage IV were not included in the present study. Less than half of these patients (41.3%) have comorbidities in the form of cardiovascular disease, hypertension, or diabetes. Hypertension was the most commonly observed comorbidity (22.3%). In the past 6 months, 39.6% of patients

Table 3

COPD knowledge according to COPD-Q.

Item	Correct answer	Percentage correct (%)	Rank
9. People with COPD may feel shortness of breath.	Yes	77.7	1
6. People with COPD often have a cough that would not go away.	Yes	57.8	2
8. Cigarette smoking or second-hand smoke causes most of the COPD cases.	Yes	54.3	3
2. The use oxygen at home can help people with COPD live longer.	Yes	49.4	4
4. COPD can be prevented.	Yes	48.6	5
11. People with COPD should have a flu shot every year.	Yes	45.7	6
10. The medicine albuterol (inhaler) can be used every time you have shortness of breath.	Yes	41.9	7
13. COPD can be reversed.	No	31.5	8
14. People with COPD should get a pneumonia shot.	Yes	24.6	9
5. People can stop taking their long-acting breathing medications (inhaler) when their COPD symptoms get better.	No	21.7	10
12. People should only use their COPD inhalers (medicines) when they cannot breathe.	No	13.9	11
7. Stopping smoking will prevent COPD from getting worse.	No	11.8	12
3. COPD medicines keep the disease from getting worse.	No	10.7	13

COPD = Chronic obstructive pulmonary disease.

Self-management behavior in COPD patients.

Domains	Lowest score	Highest score	Total score (mean±SD)	Standardized score (mean±SD)
Self-management behavior, total	74	194	117.23±20.56	2.82±0.53
Symptom management	8	29	17.36±4.13	2.89±0.69
Daily life management	21	70	42.04±8.59	3.00±0.61
Emotional management	22	60	38.78±5.98	3.23±0.50
Information management	8	40	19.05±6.22	2.38±0.78

COPD = Chronic obstructive pulmonary disease.

the information management behavior. The details are presented in Table 4.

3.5. The correlation between COPD knowledge and self-management behavior

Pearson correlation analysis revealed a significant positive correlation between the scores for self-management behavior (both total and domain scores) and COPD knowledge ($P < .01$). This means that the higher the level of a patient's COPD knowledge, the higher the level of a patient's self-management behavior (Table 5).

3.6. Multiple regression of COPD self-management behavior

Using the backward elimination method, 4 variables entered the regression equation: age, marital status, place of residence, and COPD knowledge. The R^2 of the model was 0.32 and the percent of the variability explained by the independent variables were 9.21% (age), 3.67% (marital status), 7.03% (place of residence) and 12.09% (COPD knowledge), respectively. COPD knowledge appeared to have the greatest influence on a patient's self-management behavior. The details are presented in Table 6.

4. Discussion

The present study revealed that the level of disease knowledge and self-management behavior in COPD patients is low in China. These results are in good agreement with the results and conclusions reported by previous studies in the Chinese population.[8,9] Furthermore, the present study had a high percentage (96.1%) of valid responses, representing a typical patient population observed in the respiratory ward of a tertiary hospital in China.

The highest correctness rate (77.7%) was obtained for item 9 in the COPD-Q, "People with COPD may feel shortness of breath". The reason for this might be because shortness of breath is one of the most frequent and typical symptoms of COPD. Most COPD patients experience shortness of breath during physical activity in the early stages of the disease, and as the disease progresses, these patients will start to experience shortness of breath during resting conditions. The 3 items with the lowest correctness rate were as follows: item 3, "COPD medicines keep the disease from getting worse", with a correctness rate of only 10.7%; item 7, "Stopping smoking will keep COPD from getting worse", with a correctness rate of 11.8%; item 12 "People should only use their inhalers (medicines) when they cannot breathe", with a correctness rate of 13.9%. These 3 items are all correlated to the progressive nature of COPD. Although most patients know that the regular use of medication and smoke cessation are beneficial for the disease, many do not appear to realize that COPD is an irreversible condition. There are presently no drugs or methods that can reverse lung function decline in COPD. Healthcare professionals need to use simple and easy-to-understand methods to inform patients about the natural course and prognosis of their disease, and improve their disease knowledge.

The results have also revealed that the level of self-management behavior in the studied COPD patient population was also low. Most participants (86.1%) revealed medium-to-low level of self-management behaviors. Furthermore, the self-management behavior level was lower than that observed in a previous study conducted in Tianjin,[10] where 57.1% of COPD patients were found to have a medium-to-low level of self-management behavior. This might be due to the difference in patient population. The present study included an inpatient population, while Wang et al studied an outpatient population, which most likely had a less severe disease, when compared with participants in the present study.

The standardized scores of self-management behavior in the different domains differed. The surveyed COPD patient population scored the highest in emotional management, followed by daily life management and symptom management. The lowest score was observed for information management. This could be due to the fact that COPD patients were mostly elderly patients with low education levels and low levels of literacy. Furthermore,

The correlation (r) between COPD knowledge and self-management behavior.

Self-management behavior Sub-categories	COPD knowledge	
	r	P
Self-management behavior, total	0.369	<.01
Symptom management	0.341	<.01
Daily life management	0.279	<.01
Emotional management	0.342	<.01
Information management	0.313	<.01

COPD = Chronic obstructive pulmonary disease.

Multiple regression analysis of self-management behavior in COPD patients.

Variable	Regression coefficient	Standard error	Standardized coefficient	t	P
Other variables[*]	103.323	6.735		15.632	
Age	1.327	1.963	0.132	2.301	<.05
Marital status	4.356	1.685	0.134	2.311	<.05
Place of residence	3.323	1.892	0.069	3.052	<.001
COPD knowledge	5.977	0.605	0.025	7.639	<.001

[*] Other variables include all variables, with the exclusion of age, marital status, place of residence and COPD knowledge.

they have limited reading proficiency and access to the internet. Hence, they are unable to take advantage of the large amount of information from the Internet and books. Therefore, hospitals and communities should work to increase the spread of COPD-related knowledge through other channels.

The results of the present study revealed that there was a significant positive correlation between the level of knowledge of COPD and self-management behavior, suggesting that the higher the mastery of disease knowledge, the higher the level of self-management behavior of patients, and vice versa. Although patients were recruited from a tertiary care hospital ward, the majority of patients included in the present study had GOLD stage I or II, and were not admitted to a hospital ward during the past 6 months. This result is unsurprising and consistent with previous research findings.[11] The knowledge of patients of the disease is the key factor in determining the behavior of patients. The more knowledge they acquire, the more likely they are to make decisions that are beneficial for their health. Other studies have shown that self-management education programs can lead to better disease control and improved psychosocial well-being with decreased stress levels.[12,13] A recently published study from Spain found that the education of COPD patients when they are admitted to the hospital for COPD exacerbation could significantly improve their health-related quality of life.[14]

However, the present study is only observational, and can thereby only establish a correlation, but not a cause-effect relationship between COPD disease knowledge and self-management behavior. Further intervention studies are needed to strengthen this relationship, and determine the exact methods that can be effective for improving disease knowledge and self-management behavior. It should also be noted that although the correlation between COPD knowledge and self-management behavior was highly significant ($P < .01$), the Pearson correlation coefficient (r) between these was only 0.369. This means that there are many other complicating factors involved in the equation that affects the self-management behavior of COPD patients in addition to COPD knowledge.

In conclusion, the present study shows that COPD knowledge level correlates with the level of self-management behavior in a group of Chinese COPD patients. The levels of disease knowledge and self-management behavior were both found to be low. Health education and nursing interventions focused on improving the level of disease knowledge in COPD patients may be necessary to help patients establish good self-management behavior, in order to potentially reduce the exacerbation rate and complication rate, and improve the quality of life and psychosocial well-being of COPD patients.

Author contributions

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