

## Health-related Quality of Life and Sleep Quality among COPD patients In Malaysia

Sugunesvaran Parasuraman

Hospital Tanjong Karang, Malaysia

### Abstract

Chronic Obstructive Pulmonary Disease is responsible for 7% of the total Disability-Adjusted Life Years (DALYs) in Malaysia. Sleep disorders are seen commonly among COPD patients, and it has been proven to be closely associated with reduced health-related quality of life. In this cross-sectional study, 102 COPD patients with Global Initiative for Chronic Obstructive Lung Disease classified severity were evaluated. Health related quality of life was assessed using EQD5-3L and sleep quality was assessed using Pittsburgh Sleep Quality Index (PSQI). Results showed severity of COPD is significantly associated ( $p < 0.05$ ) with all 5 dimensions of EQD5 which includes mobility, self-care, usual activities, pain or discomfort, and anxiety or depression among COPD patients in Kuala Lumpur. In this study, 71 patients (69.9%) were reported to be poor sleeper (PSQI > 5) with a mean global score of  $6.93 \pm 4.072$ . Sleep quality was also found to be significantly associated ( $p < 0.05$ ) with COPD severity, in which patients with lower severity showed better sleep quality. In this study, COPD severity was found to be significantly associated with health-related quality of life. As the disease severity progresses, both quality of life and sleep quality worsens gradually. Findings from this study had highlighted the importance to consider quality of life and sleep quality as part of the management plan for COPD patients.

### BACKGROUND

Chronic Obstructive Pulmonary Disease is a condition which is progressive and characterized by persistent airflow limitation. By the year 2020, COPD is predicted to be the third most common cause of death worldwide after ischemic heart disease and cerebrovascular accident [1]. In Malaysia, COPD is stated as the seventh most common cause of premature death for 2010 according to the Global Burden of Disease. Chronic respiratory disease including COPD is responsible for seven percent of Disability-Adjusted Life Years in Malaysia [2].

The prevalence of COPD in Malaysia is 4.7% which is estimated by COPD prevalence model that utilizes risk factors and epidemiological relationships to project the prevalence rate in a population aged 30 years old and above. COPD is a preventable condition and also treatable. However, COPD patients mostly experience symptoms that significantly affects their quality of life and sleep quality due to the symptoms of COPD. Common symptoms in COPD patients such as cough, dyspnea and production of sputum affects quality of life based on severity of disease [3].

Health-related quality of life in COPD patients can represent the measure of overall control of the disease. Even patients with mild COPD shows compromised quality of life, and also keeping in mind that comorbid conditions also affects the relationship between COPD and health related quality of life [4]. Quality of life in COPD impacts not only the patients themselves, also on financial. Loss of productivity due to disability pension was the main indirect cost in study conducted in Sweden at which the study also stated 90% of the indirect costs or annual average costs were SEK 7,079 per person [5].

Sleep disturbance in COPD patients are often underestimated and overlooked clinically. In addition to that, certainly issues related to quality of sleep in COPD are not a focus of current COPD management guidelines. Poor survival in COPD patients is strongly linked to sleep disturbance caused by the disease itself. Respiratory symptoms caused by COPD such as dyspnoea and nocturnal cough leads to poor sleep quality and insomnia [6]. Disturbance in sleep and poor sleep quality contributes to frequent episodes of exacerbation which directly increases mortality risk. Impaired cognitive function in COPD patients is due to poor sleep quality pattern, thus affects

**Correspondence to:** Sugunesvaran Parasuraman, Hospital Tanjong Karang, Malaysia. Email: sugunesvaran1983@gmail.com

**Received:** June 19, 2020; **Accepted:** August 25, 2020; **Published:** March 24, 2021

**Citation:** Sugunesvaran Parasuraman, Health-related Quality of Life and Sleep Quality among COPD patients In Malaysia. ISSN no. 2261-7434 Volume 10, Issue 2

**Copyright:** © 2021 Sugunesvaran Parasuraman, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

the quality of life. Most COPD patients have trouble initiating sleep, maintaining sleep, reduced REM sleep, micro-arousals and frequent sleep stage shifts which disturbs sleep efficiency [7].

Sleep quality and health related quality of life are the two most important aspects that need to be emphasized and explored among COPD patients. The aim of this study is to determine health-related quality of life and sleep quality among COPD patients and to determine the association between health-related quality of life and sleep quality among COPD patients.

## METHODS

This study was in conformity with the ethical guidelines of the Declaration of Helsinki and approval was obtained from Malaysia Research and Ethic Committee. Patient Information Sheet was given and informed consent form was signed and dated by patient and the person authorized by principle investigator before proceeding to give the set of questionnaires to be answered.

### Patients' selection.

Total number of 102 COPD patients were recruited from COPD Specialist Clinic Institut Perubatan Respiratori, Hospital Kuala Lumpur, Malaysia from August 2018 to October 2018. Diagnosis and staging were performed on the basis of Global Initiative for Chronic Obstructive Lung Disease standard. In order to group participants according to GOLD Classification 2019, the Refined ABCD Assessment tool used. The latest FEV<sub>1</sub> post bronchodilator performed for each COPD patient were gathered from their respective case files. Inclusion criteria are Malaysians diagnosed with COPD. Exclusion criteria are patients with pulmonary tuberculosis, pregnancy, HIV positive, cancer and emphysema. Patients were informed about the nature and consequences of the study and their consent was taken.

### Refined ABCD Assessment Tool

The Refined ABCD assessment tool uses two measures which comprises the total number of exacerbations a patient experienced in last year and symptoms of COPD. This tool does not include airflow limitation into account for treatment decision [8]. It recommends comprehensive symptoms using COPD Assessment Test (CAT) questionnaire or modified Medical Research Council scale (mMRC), instead of just asking about breathlessness. (mMRC score used in this study).

Group A: patients have had zero or one exacerbations in the previous year and mMRC score 0 - 1

Group B: patients have had zero or one exacerbation in the previous year but mMRC score equals or more than 2

Group C: patients have had more than one or two exacerbations in the previous year and mMRC score 0 - 1

Group D: patients have had more than one or two exacerbations in the previous year and mMRC score equals or more than 2

### Sleep Quality (PSQI)

Pittsburgh Sleep Quality Questionnaire (PSQI) was used to assess sleep quality among COPD patients, which is standardized valid instrument designed to measure sleep quality [9]. This questionnaire comprises a total of 19 questions that create 7 major components. Each component is scored from 0 to 3 points, in which lower point signifies no problems, while higher score signifies worsening problems. A scale from 0 to 21 points given by sum of scores of the 7 components. For this study, the results categorized into two groups:  $\leq 5$  good sleep quality (score  $\leq 5$ ) and poor sleep quality (score  $> 5$ ) [9].

### Health related Quality of Life (EQD5-3L)

The EQ-5D-3 L questionnaire was used to assess health related quality of life. This questionnaire has two parts: the descriptive section, consists 5 dimensions of health: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has 3 levels for each dimension at which Level 1 of each dimension to show no problem in the dimension. Whereas Level 2 and Level 3 choice of each dimension to show if participants have problems in that particular dimension, at which Level 2 and Level 3 choices vary with each other in terms of intensity of problem. In the table above, EQD5 classified as 'no problem' which is level 1 and 'problems' which are Level 2 and Level 3 [10].

### Statistical Analysis

Sleep Quality and Health related Quality of Life among COPD patients in GOLD classification were compared using Chi<sup>2</sup>-tests for categorical variables and analysis of variance (ANOVA) for continuous variables. Association between the sleep quality and HRQoL quantified by Spearman's rank coefficient. Statistical analyses were performed using SPSS software version 20.0 and p-values of 0.05 or less were considered to be statistically significant.

**RESULTS**

The total number of participants in this research from August 2018 until end of October 2018 is 102 (Table 1). Median age of participants is 67.5 (IQR 7) and mean age of participants is 66.8. In term of age category, majority are from age group of 51- 80 years ago, which accounts 89.3% of total participants in this study. Lower percentage of age group diagnosed to have COPD is in the category of 30 - 40 years old, which is about 2%. 96 (94.1%) participants recruited are males compared to 6 (5.9%) female participants in this study. In term of ethnicity, 51 (50.0 %) of the participants recruited are Malay and 28 (27.5%) Chinese and 23 (22.5%) consist of Indian. Out of 102 participants, 77 (77.5%) of them are ex-smokers whereas 24 (23.5%) are still active smokers. One participant has never smoked before, and based on further history, it was clear that current condition is due to occupational related. Education levels were mostly secondary school (n=50, 49%) with least being bachelor degree (n=6, 5.4%). Diploma holders are about 18(17.6%) and participants with primary school qualification is about 28 (27.5%). Regarding monthly incomes, 60 (58.8%) in the category of income ranging from rm1000- 4999. Whereas, 41 (40.2%) of them earns about less than rm1000 per month.

**Health related Quality of Life (EQD5-3L)**

Health Related Quality of Life is significantly associated with COPD severity (p<0.01). In terms of mobility, 19 participants who has no problem in mobilizing are mostly from GOLD A ( n = 13 ), and about 2 of them from GOLD B. 4 of the participants who has no issues with mobility are from GOLD C. None of them are from GOLD D. Those participants (n= 83) who have problems in mobility are from all groups in GOLD classification. GOLD A which mentioned to be low risk and low symptom burden, contributes about 25 participants (30.1%) who has problems in mobility.

Characteristic	Median	GOLD Classification				p value
		A	B	C	D	
Age (Median,IQR)	67.5					
Age Group	30 - 40	1(50.0%)	0 (0.0%)	1(50.0%)	0(0.0%)	<b>p=0.039*</b>
	41 - 50	0(0.0%)	0(0.0%)	3(75.0%)	1(25.0%)	
	51 - 60	3(14.3%)	2(9.5%)	9(42.9%)	7(33.3%)	
	61 - 70	16(50.0%)	0(0.0%)	7(21.9%)	9(28.1%)	
	71 - 80	14(36.8%)	3(7.9%)	6(15.8%)	15(39.5%)	
	> 80	4(80.0%)	1(20.0%)	0(0.0%)	0(0.0%)	
Ethnicity	Malay	14(27.5%)	4(7.8%)	17(33.3%)	16(31.4%)	<b>p=0.103</b>
	Indian	12(52.2%)	2(8.7%)	5(21.7%)	4(17.4%)	
	Chinese	12(42.9%)	0(0.0%)	4(14.3%)	12(42.9%)	
Gender	male	35(36.5%)	5(5.2%)	26(27.1%)	30(31.2%)	<b>p=0.366</b>
	female	3(50.0%)	1(16.7%)	0(0.0%)	2(33.3%)	
Smoking status	active smoker	6(25.0%)	0(0.0%)	9(37.5%)	9(37.5%)	<b>p=0.002*</b>
	ex-smoker	32(41.6%)	5(6.5%)	17(22.1%)	23(29.9%)	
	never smoked before	0(0.0%)	1(100%)	0(0.0%)	0(0.0%)	
Education level	primary school	7(25.0%)	3(10.7%)	7(25.0%)	11(39.3%)	<b>p=0.487</b>
	secondary school	20(40.0%)	3(6.0%)	11(22.0%)	16(32.0%)	
	diploma	8(44.4%)	0(0.0%)	5(27.8%)	5(27.8%)	
	bachelor	3(50.0%)	0(0.0%)	3(50.0%)	0(0.0%)	
Monthly income	<rm1000	15(36.6%)	3(7.3%)	10(24.4%)	13(31.7%)	<b>p=0.922</b>
	rm1000-rm4999	22(36.7%)	3(5.0%)	16(26.7%)	19(31.7%)	
	rm5000-rm10000	1(100%)	0(0.0%)	0(0.0%)	0(0.0%)	

Table 1: Socio-demographic factors of COPD patients

Pain shows significant association among COPD patients in health-related quality of life. According to this study, more participants from GOLD C and D are seen experience pain comparative GOLD A and GOLD A, which affects the quality of life. Anxiety or depres-

sion among COPD patient shows significant association ( $p < 0.05$ ) with GOLD classification. Participants from GOLD D shows highest percentage of COPD patients who have some degree of anxiety or depression. The 5 dimensions of EQD5 which includes mobility, self-care, usual activities, pain or discomfort and anxiety or depression are summarized in general, regardless of COPD severity in above table (Table 2). Most COPD patients have troubles in mobility as it shows almost 81.4%.

EQ-D5 DIMENSION		GOLD classification				Total
		A	B	C	D	
<b>MOBILITY<sup>a</sup></b>	No problem	13	2	4	0	19
	<b>p value 0.002</b>	Problems	25	4	22	32
<b>SELFCARE<sup>a</sup></b>	No problem	34	4	22	7	67
	<b>p value 0.000</b>	Problems	4	2	4	25
<b>USUAL ACTIVITY<sup>a</sup></b>	No problem	30	1	19	3	53
	<b>p value 0.000</b>	Problems	8	5	7	29
<b>PAIN<sup>a</sup></b>	No problem	37	4	22	19	82
	<b>p value 0.001</b>	Problems	1	2	4	13
<b>ANXIETY<sup>a</sup></b>	No problem	36	4	23	14	77
	<b>p value 0.000</b>	Problems	2	2	3	18

<sup>a</sup> Analysis using Pearson Chi-square test ( $p < 0.05$ )

Table 2: EQD5-3L dimension based on COPD GOLD Classification.

EQVAS portrays participants' health state based on a scale on which 100 signifies the best state you can imagine and 0 is the worst state you can imagine. About 30 participants from GOLD D showed EQVAS 26 - 50, whereas 28 participants from GOLD A showed EQVAS 51 - 75 and 8 participants from GOLD A showed EQVAS 76 - 100. Based on this findings, participants ( $n=36$ , 94.7%) from less severe COPD group (GOLD A) chose better health state on the scale provided whereas, majority participants ( $n=30$ , 93.8%) from most severe form of COPD group (GOLD D) chose worse health state on the scale.

### Sleep Quality

COPD severity was found to be significantly associated ( $P < 0.05$ ) with all the PSQI parameters, which includes subjective sleep quality, sleep duration, sleep latency, daytime dysfunction, step disturbances, habitual sleep efficiency and use of sleep medications (Table 3). Participants from GOLD class A which is less severe shows higher tendency of better sleeping quality, with 25 patients reported to have good sleep, which scored less 5 on Global Score of PSQI (Table 4).

Majority participants from GOLD D which most severe in COPD severity found to be poor sleepers, with 32 reported to have poor sleep (scored 5 or more on Global Score of PSQI).

PITTSBURGH SLEEP QUALITY INDEX <sup>a</sup>	GOLD Classification				Total
	A	B	C	D	
POOR SLEEPERS	13	5	21	32	71
GOOD SLEEPERS	25	1	5	0	31
<b>Total</b>	<b>38</b>	<b>6</b>	<b>26</b>	<b>32</b>	<b>102</b>

<sup>a</sup> Analysis using Pearson Chi-square test  $p=0.000$  ( $p < 0.05$ )

Table 3: PSQI in association with GOLD classification

DAYTIME DYSFUNCTION <sup>a</sup>	0	18(56.3%)	1(3.1%)	10(31.3%)	3(9.4%)	p=0.000*
	1	18(41.9%)	3(7.0%)	15(34.9%)	7(16.3%)	
	2	2(7.4%)	2(7.4%)	1(3.7%)	22(81.5%)	
	3	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	
STEP DISTURBANCES <sup>a</sup>	0	0(0.0%)	0(0.0%)	2(100.0%)	0(0.0%)	p=0.009*
	1	34(43.0%)	5(6.3%)	21(26.6%)	19(24.1%)	
	2	4(19.0%)	1(4.8%)	3(14.3%)	13(61.9%)	
	3	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	
HABITUAL SLEEP EFFICIENCY <sup>a</sup>	0	35(87.5%)	4(10.0%)	1(2.5%)	0(0.0%)	p=0.000*
	1	3(11.1%)	2(7.4%)	17(63.0%)	5(18.5%)	
	2	0(0.0%)	0(0.0%)	7(26.9%)	19(73.1%)	
	3	0(0.0%)	0(0.0%)	1(11.1%)	8(88.9%)	
USE OF SLEEPING MEDICATIONS <sup>a</sup>	0	37(39.8%)	5(5.4%)	25(26.9%)	26(28.0%)	p=0.004*
	1	1(14.3%)	0(0.0%)	1(14.3%)	5(71.4%)	
	2	0(0.0%)	0(0.0%)	0(0.0%)	1(100.0%)	
	3	0(0.0%)	1(100.0%)	0(0.0%)	0(0.0%)	

Table 4: Association of PSQI scores with COPD severity

### Association between Health-related Quality of Life and Sleep Quality among COPD patients

Study showed that there was a significant association between EQD5-3L and PSQI (Table 5). Sleep quality was significantly associated ( $P < 0.05$ ) with mobility among patients, where most of the patients who had problems in mobility (79.5%) are poor sleeper. Sleep quality was also reported to be significantly associated ( $P < 0.05$ ) with self-care among patient. 97.1%  $n=34$  participants who had problems in self-care are poor sleepers. On the other hand, 91.8%  $n=45$  participants who had problems in their usual activities, such as work, family or leisure activities were found to be poor sleepers. About 95.0% of participants who reported some degree of pain or discomfort are poor sleepers, this showed sleep quality was significantly associated ( $p < 0.05$ ) with pain or discomfort among COPD patients. Besides that, 96.0% of participants who showed some degree of anxiety were poor sleepers. Sleep quality was significantly associated ( $P$  value  $< 0.05$ ) with anxiety or depression among COPD patients. In a nutshell, association between health-related quality of life (EQD5) and sleep quality (PSQI) among COPD patients was statistically significant ( $P < 0.05$ )

EQD5 DIMENSION		PSQI		Total	p value
		POOR SLEEPERS	GOOD SLEEPERS		
MOBILITY <sup>b</sup>	no problem	8(42.1%)	11(57.9%)	19	0.006*
	problems	63(75.9%)	20(24.1%)	83	
SELFCARE <sup>b</sup>	no problem	37(55.2%)	30(44.8%)	67	0.000*
	problems	34(97.1%)	1(2.9%)	35	
USUAL ACTIVITIES <sup>b</sup>	no problem	26(49.1%)	27(50.9%)	53	0.000*
	problems	45(91.8%)	4(8.2%)	49	
PAIN/DISCOMFORT <sup>b</sup>	no problem	52(63.4%)	30(36.6%)	82	0.006*
	problems	19(95.0%)	1(5.0%)	20	
ANXIETY <sup>b</sup>	no problem	47(61.0%)	30(39.0%)	77	0.001*
	problems	24(96.0%)	1(4.0%)	25	

Table 5: Summary of Association between EQD5 and PSQI

## DISCUSSIONS

### Socio-demographic profile of COPD patients

The median age of participants in this study was 67.5 (7 IQR) with males being the predominant gender. The most common age group in study reported to be COPD patients are those from 51- 80 years of age and majority of them were males. In a study conducted in Taiwan, most patients were elderly and 98 % were male [11]. It is perceived that patients usually present after development of chronic disease progression which explains predominantly older age group among COPD patients. Similar findings were reported

in study done in Poland [12]. This is probably may be due to lack of awareness among patients regarding recognition of early symptoms of COPD. Approximately similar findings seen in a study at which majority of the participants in that study were males 127 (90.7%) and most 87 (62.14%) of them were between the age group of 61-86 years [13]. Besides that, also reported that prevalence of smoking was highest among the Malays (55.9%) and those aged 21-30 years (59.3%) in prevalence study in Malaysia [14].

### Health-related Quality of Life in COPD patients



COPD severity is significantly associated ( $p < 0.05$ ) with all 5 dimensions of EQD5 which includes mobility, self-care, usual activities, pain or discomfort, and anxiety among COPD patients. Due to the progression of disease which causes functional ability deterioration which may lead to emotional issues such as anxiety. This can be clearly seen in this study at which most activities involving functional ability such as mobility, self-care and usual activities are reported to have majority number of participants from GOLD C and GOLD D (severe form of COPD severity). In a study conducted in Italy, the frequency of symptoms increased significantly with the severity of COPD [15].

Besides functional abilities, emotional issues such as anxiety or depression also reported to be increasing in number as disease severity worsening from GOLD A to GOLD D. Probably COPD patients may face or experience emotional changes such as anxiety as they realise their functional abilities worsen as disease progresses [6]. It is reported in a study that depression which is common among COPD patients cause significant impact on quality of life. It is associated with higher mortality rate and affects compliance (Wilson, 2006). Educational level has significant relation in terms of 'Usual Activities' which is a part of EQD5 ( $p < 0.05$ ). Female gender has more troubles in usual activities compare to male participants in this study. Poorer health related quality of life seen in females with COPD.

Moderate to severe COPD patients demonstrated that females had poorer health related quality of life, especially on the impact and activity scores of the SGRQ [16].

In this study also, pain or discomfort in EQD5 reported to increase as disease severity progression from GOLD A to GOLD D. Pain or discomfort in COPD patients can be due pathophysiological changes that happens when COPD disease progresses and also can due to worsening functional abilities. In another study conducted at West Park Healthcare Centre, it was found that presence of pain in a cohort of stable participants with severe or very severe COPD [17].

According to a study, with increasing severity of disease, health-related quality of life in COPD patient deteriorates and also stated that this deterioration is linearly related with predicted values of Forced Expiratory Volume of 1 sec (FEV1) [18]. In another study, both EQ-5D utility score and EQ-5D Visual Analogue Scale declined significantly between moderate and severe COPD [19]. In a cross-sectional analysis conducted in German reported worsening mean score of SGRQ, CAT and EQD5 with higher COPD grades [20].

### Sleep Quality among COPD patients

Many studies reported patients with COPD often have poor sleep quality and night-time symptoms. Obstructive sleep apnoea, psychiatric disorder and medication related insomnia are the contributing factors to poor sleep quality among COPD patients [21]. However, sleep disturbances in COPD are generally not seen as priority in COPD clinical management. In this study participants ( $n = 71$ , 70.0%) had mean PSQI scores of  $6.93 \pm 4.072$ . Similar results have been also reported in studies conducted in Israel, Iran and Taiwan with theme an scores of  $11.0 \pm 5.4$ ,  $8.03 \pm 3.66$  and  $9.41 \pm 4.33$  respectively [22, 23, 24].

In this study, findings suggestive of worsening sleep quality as COPD disease severity progresses. Similar findings are seen in a study conducted by Lewis and co-workers (2008) which states 59 patients with moderate to-severe COPD found that 61% had poor quality sleep (PSQI > 5). Sleep quality is very important for an individual regardless of the comorbidities. Many studies showed that poor sleep quality causes many negative effects to the individuals such as being fatigue, anxiety or changes in cognitive functions [25,26].

### Health related Quality of Life and Sleep Quality among COPD patients

From this study, the association of all 5 dimensions of EQD5 (Mobility, Self-care, Usual Activities, Pain or Discomfort, Anxiety) with sleep quality (which categorized based Global Score of PSQI) was found to be statistically significant ( $p < 0.05$ ). Most participants ( $n = 66$ , 75.9%) who had problems in mobility were poor sleepers. About 97.1% participants who had problems in self-care are poor sleepers. Parallel findings noted in study assessed self-disturbance and implication of self-care in failure which showed disturbed sleep is associated with symptoms and functional deficits [27]. Usual activities such as work, study, homework, family or leisure activities were found to be significantly ( $P < 0.05$ ) associated with sleep quality, where 91.8% participants who had problems in their usual activities are poor sleepers.

About 95.0% of participants who reported some degree of pain or discomfort are poor sleepers. Pain among COPD patients varies. In a cross-sectional study carried out with data collected from the European Health Interview Surveys for Spain (EHSS) conducted in years 2009/2010, the prevalence of chronic neck pain, chronic lower back pain, and migraine was significantly higher among COPD patients in comparison with controls [28]. Many factors, including pain, disease process, and medication used to control the disease may disturb sleep. Sleep disturbances may also adversely affect the natural course of the painful disease. This vicious circle can be controlled by improving sleep quantity and quality in patients with painful disorders [29]. Besides that, 96.0% of participants who showed some degree of anxiety are poor sleepers ( $p < 0.05$ ). Impaired health positively associated with anxiety. In a prospective study, the scores of SGRQ which assess the quality of life for patients admitted with acute exacerbation of obstructive airway disease in 5 university hospitals in the Nordic countries, were up to 12 units after COPD discharged from hospital. This is considered 3 times clinically significant [30].

## CONCLUSIONS

This study identified that COPD patients have their quality of life and sleep quality significant association with disease severity. As the disease severity progresses, both quality of life and sleep quality worsens gradually. Sleep quality of an individual who suffers from COPD also affects health related quality of life. Findings from this study may assist to manage COPD patient more accurately, since we know that pharmacological treatment is not comprehensive enough to manage COPD patients. Quality of life and sleep quality should be considered when it comes to management plan for COPD patients.

## ACKNOWLEDGEMENTS

This work was supported by Ministry of Education, under the funding of Fundamental Research Grant Scheme [FRGS/2/2014/SKK10/UCSI/03/1].

## DECLARATIONS

### Ethics approval and consent to participate

The study approval NMRR -17-3335-38518(IIR) was obtained from Malaysia Research and Ethic Committee (MREC). Patient Information Sheet was given and informed consent form was signed and dated by patient and the person authorized by principle investigator before proceed to give the set of questionnaires to be answered.

### Availability of data and materials

The datasets generated and/or analyzed during the current study were harvested from clinic database, therefore it is not publicly available as it might compromise patient's privacy, but are available from the corresponding author on reasonable request.

### Competing interests

The authors declare that they have no competing interest.

### Consent for publication

Not applicable.

### Funding

This work was supported by Ministry of Education, under the funding of Fundamental Research Grant Scheme [FRGS/2/2014/SKK10/UCSI/03/1].

### Authors contributions

SP - involved in data collection, analysis/interpretation of data, involved in the drafting/revision of manuscript; and has read and given approval of final draft. TCK - analysis/interpretation of data, involved in the drafting/revision of manuscript; and has read and given approval of final draft. NBMM - study conception and design, analysis of data, patient management, drafting of manuscript; and has read and has given approval of final draft.

### Acknowledgements

Special acknowledgements to Dr. Mohd Zamri Bin Wagiman Director of Hospital Tanjong Karang for providing permission to conduct this study.

## REFERENCES

1. Onishi K. Total management of chronic obstructive pulmonary disease (COPD) as an independent risk factor for cardiovascular disease. *J Cardiol* 2017; 70(2):128-34.
2. Guidelines in The Management of Chronic Obstructive Pulmonary Disease-A Consensus Statement of The Ministry of Health of Malaysia, Academy of Medicine of Malaysia And Malaysian Thoracic Society. *Med J Malaysia* 1999; 54:387-400.
3. Oliveira AS, Munhá J, Bugalho A, et al. Identification and assessment of COPD exacerbations. *Pulmonology* 2018; 24(1):42-7.
4. Ferrer M, Alonso J, Morera, J, et al. Chronic obstructive pulmonary disease stage and health-related quality of life. *Ann Intern Med* 127, 1072-1079.
5. Jansson SA, Andersson F, Borg S, et al. Costs of COPD in Sweden according to disease severity. *Chest* 2002; 122(6):1994-2002.
6. Omachi TA, Blanc PD, Claman DM, et al. Disturbed sleep among COPD patients is longitudinally associated with mortality and adverse COPD outcomes. *Sleep Med* 2012; 13(5):476-83.
7. McNicholas WT, Verbraecken J, Marin JM. Sleep disorders in COPD: the forgotten dimension. *Eur Respir Rev* 2013; 22(129):365-75.

8. Vogelmeier CF, Criner GJ, Martinez FJ, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive lung disease 2017 report. GOLD executive summary. *Am J Respir Crit Care Med* 2017; 195(5):557-82.
9. Buysse DJ, Reynolds III CF, Monk TH, et al. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 1989; 28(2):193-213
10. Rabin R, Charro FD. EQ-SD: a measure of health status from the EuroQol Group. *Ann Med* 2001; 33(5):337-43
11. Chang CH, Chuang LP, Lin SW, et al. Factors responsible for poor sleep quality in patients with chronic obstructive pulmonary disease. *BMC Pulm Med* 2016; 16(1):118.
12. Balcells E, Gea J, Ferrer J, et al. Factors affecting the relationship between psychological status and quality of life in COPD patients. *Health Qual Life Outcomes* 2010; 8(1):108.
13. Castelino F, Prabhu M, Pai MS, et al. Socio-demographic and clinical characteristics of Chronic Obstructive Pulmonary Disease (COPD) patients. *Manipal Journal of Nursing and Health Sciences (MJNHS)*. 2017; 3(2):55-8.
14. Lim HK, Ghazali SM, Kee CC, et al. Epidemiology of smoking among Malaysian adult males: prevalence and associated factors. *BMC Public Health* 2013; 13(1):8.
15. Nicola S, Raffaele AI, Francesco B, et al. Circadian rhythm of COPD symptoms in clinically based phenotypes. *BMC Pulm Med* 2019 ;19(1):171.
16. Osman IM, Godden DJ, Friend JA, et al. Quality of life and hospital re-admission in patients with chronic obstructive pulmonary disease. *Thorax* 1997; 52(1):67-71.
17. Lee AL, Goldstein RS, Brooks D. Chronic pain in people with chronic obstructive pulmonary disease: prevalence, clinical and psychological implications. *Chronic Obstr Pulm Dis* 2017;4(3):194.
18. Ståhl E, Lindberg A, Jansson SA, et al. Health-related quality of life is related to COPD disease severity. *Health Qual Life Outcomes* 2005; 3(1):56.
19. Hong JY, Kim SY, Chung KS, et al. Factors associated with the quality of life of Korean COPD patients as measured by the EQ-5D. *Qual Life Res* 2015; 24(10):2549-58.
20. Wacker ME, Jörres RA, Karch A, et al. Assessing health-related quality of life in COPD: comparing generic and disease-specific instruments with focus on comorbidities. *BMC Pulm Med* 2016; 16(1):70.
21. McNicholas WT, Calverley PM, Lee A, et al. Long-acting inhaled anticholinergic therapy improves sleeping oxygen saturation in COPD. *Eur Respir J* 2004; 23(6):825-31.
22. Zohal MA, Yazdi Z, Kazemifar AM. Daytime sleepiness and quality of sleep in patients with COPD compared to control group. *Glob J Health Sci* 2013; 5(3):150.
23. Scharf SM, Maimon N, Simon-Tuval T, et al. Sleep quality predicts quality of life in chronic obstructive pulmonary disease. *Int J Chron Obstruct Pulmon Dis* 2011; 6:1.
24. Lan CC, Huang HC, Yang MC, et al. Pulmonary rehabilitation improves subjective sleep quality in COPD. *Respiratory care* 2014; 59(10):1569-76.
25. Hynninen MJ, Pallesen S, Nordhus IH. Factors affecting health status in COPD patients with co-morbid anxiety or depression. *Int J Chron Obstruct Pulmon Dis* 2007 ;2(3):323.
26. Shackell BS, Jones RCM, Harding G, et al. Am I going to see the next morning? A qualitative study of patients' perspectives of sleep in COPD. *Prim Care Respir J* 2007;16(6) 378-383.
27. Redeker NS. Sleep disturbance in people with heart failure: implications for self-care. *J Cardiovasc Nurs* 2008; 23(3):231-8.
28. de Miguel-Díez J, López-de-Andrés A, Hernandez-Barrera V, et al. Prevalence of Pain in COPD Patients and Associated Factors. *Clin J Pain* 2018; 34(9):787-94.
29. Onen SH, Onen F, Courpron P, et al. How pain and analgesics disturb sleep. *Clin J Pain* 2005; 21(5):422-31.
30. Gudmundsson G, Gislason T, Janson C, et al. Depression, anxiety and health status after hospitalization for COPD: a multicentre study in the Nordic countries. *Respir Med* 2006; 100(1):87- 93.