

Research Article

Sleep Disorders as Predictor of Health-Related Quality of Life in Patients with COPD

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Abstract

Objectives: Chronic Obstructive Pulmonary Disease (COPD) patients often suffer from poor sleep and health-related quality of life (HRQoL). The purpose of the current study was to find out the frequency of sleep disorders in COPD patients and to examine their role in predicting health-related quality of life after accounting for demographics and COPD disease severity.

Method: It was a cross sectional analytical study and the sample consisted of 150 COPD patients with age ranging from 40-70 years selected through non-probability convenient sampling technique. Sleep disorders scale and WHO quality of life scale were used to collect data from a pulmonary clinic of Lahore. Results: The results revealed that sleep disorders were present in 47 (31%) patients. Sleep disorders were a significant predictor of HRQoL in COPD patients and hierarchical multiple regression model revealed insomnia ($p < .05$), hypersomnia ($p < .01$), restless legs syndrome ($p < .05$), and sleep-related breathing disorder ($p < .01$) to contribute significantly to different dimensions of HRQoL.

Conclusion: Sleep disorders are quite prevalent in COPD patients and this study ascertains the need for timely screening and management of sleep disorders in patients for enhanced quality of life.

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Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of morbidity and mortality around the world. It is the fourth major cause of death in the world and is estimated to become the third by 2020. Exposure to COPD's risk factors are increasing progressively, and therefore, COPD burden is predicted to increase globally in the decades to come. More than 90% of the deaths caused by COPD occur in middle and low income countries. Sleep quality is known to be poor in COPD patients and sleep disturbances are linked to deteriorated quality of life in this population.¹

PSG studies have shown lower overnight mean oxygen saturation and reduced sleep efficiency in COPD patients as compared to controls.² COPD symptoms that may cause nocturnal awakenings include wheezing, coughing, breathlessness and chest tightness. It is observed that patients who have frequent night time arousals have worst respiratory disease.³ Their risk for disease complications is also high as compared to the ones with appropriate sleep. They often have shortened sleep duration, delayed sleep onset, frequent nocturnal awakenings, and short REM sleep, thereby, experiencing difficulties in maintaining sleep more frequently than the general population.⁴ Even when a full-fledged sleep disorder

doesn't exist, sleep related complaints are frequently reported by COPD sufferers. After dyspnea and fatigue, sleep related complaints are classified as one of the most commonly reported symptom in these patients.⁵ And this is why, CAT, the COPD's symptoms assessment test recommended by GOLD¹ also has one question on sleep out of its eight questions.

A good night's sleep is paramount for leading a healthy and productive lifestyle and this is why sleep and sleep related disorders play an important role in relation to health. People with sleep problems and disorders are more susceptible to accidents, have reduced performance at work, higher work absenteeism, deteriorated quality of life, and more utilization of health care resources as compared to good sleepers.⁶

Presence of sleep disorders have been seen to have an adverse impact on multiple aspects of quality of life (QoL). It is seen as an individual's overall well-being and a subjective perspective about how satisfied an individual is with his/her life in general.⁷ Health is one of its significant dimension and quality of life in relation to health is referred to as health-related quality of life (HRQoL).⁸ Sleep disorders affect HRQoL adversely and an understanding of their influence on the individual is important so that health care services could be tailored according to the specific needs of the patient. Physical functioning is worsened in individuals having frequent sleep problems (more than thrice per week) as compared to ones having no or less frequent sleep issues. Moreover, even after adjusting for several demographic variables and current medical illness which are identified as known factors affecting HRQoL, the association of diminished HRQoL with severe sleep problems persists.⁹

COPD which affects millions of people worldwide disturbs sleep with adverse effect on the QoL. Despite this, a thorough assessment of sleep disorders and their impact on different aspects of COPD patients' lives is a neglected area when compared to work done in other chronic illnesses.¹⁰ Sleep related problems are observed to be worse in COPD as compared to other medical conditions. Sleep fragmentation and the resulting sleep deprivation in these individuals not only results in excessive daytime sleepiness and poor cognitive functioning during the day but also leads to

mental and social problems.¹¹

HRQoL in COPD has been examined previously, however, prevalence and impact of sleep disorders in COPD has not been studied in Pakistan. Early screening and identification of any kind of alteration in the quality of sleep could facilitate a preventive approach enhancing quality of life in this patient group as it is a potentially modifiable risk factor of reduced QoL. The current study focused on screening the patients for presence of different types of sleep disorders in COPD patients and examine their impact on HRQoL.

Methods

Cross-sectional analytical research design was used to examine the impact of sleep disorders on HRQoL in COPD patients belonging to different stages of disease severity. Non-probability convenience sampling technique was employed to collect data from a pulmonary clinics of Lahore. The sample consisted of physician diagnosed COPD patients (N=150) with age ranging from 40-70 years (53.93±8.17). Spirometry values were used for determining the severity of the disease (1). A FEV1 percentage of > 80% was taken as mild (stage 1), 50-80% as moderate (stage 2), 30-50% as severe (stage 3), while <30% as very severe (Stage 4). The demographic characteristics of the sample are given in Table 1.

Table 1: Mean, Standard Deviation, Frequencies, and Percentages of Demographic Variables (N=150)

Variable	f (%)	M (SD)
Gender		
Male	97 (64.7)	
Female	53 (35.3)	
Age (in years)		53.93 (8.17)
Stage II (moderate)	45 (30)	
Stage III (severe)	56 (37.3)	
Stage IV (very severe)	49 (32.7)	
Duration of COPD		10.04 (4.96)

Two research questionnaires as well as a self-constructed demographic form were administered on the participants for assessing variables of interest.

Sleep disorders were assessed through sleep disorders scale¹² which consists of 47 items and screen individuals for the presence of a sleep disorder according to DSM-5 criteria. It consists of 11 sub-

scales which are insomnia, hypersomnia, narcolepsy, sleep-related breathing disorder, advanced sleep phase type, delayed sleep phase type, non-REM sleep arousal disorders, nightmare disorder, REM behavior disorder, restless legs syndrome, and general sleep problems (dissatisfaction with quality and/or quantity of sleep, poor daytime functioning due to disturbed sleep). The scale has good internal consistency reliability ($\alpha=.86$).

HRQoL was measured through WHO quality of life scale (WHOQOL-BREF)⁽⁴³⁾, urdu translation. The scale consists of 26 items which assess four domains of QoL namely: physical health, psychological health, social relationships and environment. The Cronbach alpha of the scale came out to be good ($\alpha=.73$).

The demographic and clinical history form was used to get the participant's information related to socio-demographic and clinical history variables (stage and duration of disease, comorbidities, and disease symptoms). Approval for the study was taken from the departmental ethical review board and data was collected from a pulmonary clinic of Lahore. The participants who met the inclusion criteria were briefed about the nature and purpose of the study and informed consent was taken. SPSS version 21 was used to analyze the data.

Results

The frequency and percentages of the presence of sleep disorders in COPD patients were calculated.

Table 2: Prevalence of Different Sleep Disorders in COPD Patients According to Disease Severity (N=150)

Variables	COPD (N=150)			
	Total f(%)	Moderate (n=45) f(%)	Severe (n=56) f(%)	V. severe (n=49) f(%)
Sleep disorders	47(31%)	4 (8.9%)	22 (39.3%)	21 (42.9%)
Insomnia	21(14%)	1(2.2%)	10 (17.9%)	10 (20.4%)
Hypersomnia	14(9.3%)	—	7 (12.5%)	7 (14.3%)
Narcolepsy	5 (3.3%)	—	3 (5.4%)	2 (4.1%)
SRBD	12 (8%)	2 (4.4%)	3 (5.4%)	7 (14.3%)
RBD	3 (2%)	—	2 (3.6%)	1 (2%)
Restless legs syndrome	12 (8%)	4 (8.9%)	4 (7.14%)	4 (8.16%)
General sleep problems	35(23.3%)	2 (4.4%)	15 (26.8%)	18 (36.7%)

Note. SRBD: Sleep-related breathing disorder; RBD: REM sleep behavior disorder.

Hierarchical multiple regression analysis was performed to examine the factors and sleep disorders which contribute to health-related quality of life in COPD patients. The results were considered statistically significant at level $p<.05$.

Table 2 shows the frequency of different types of sleep disorders in COPD patients belonging to different stages of the disease.

Discussion

Insomnia was most prevalent in the sample followed by hypersomnia. Overall, sleep problems were high (23.3%) in all the patient groups specifically in the severe stages of the disease. SRBD and RLS were the other two sleep disorders with a relatively higher percentage. No cases of ASPS, DSPS, non-REM sleep arousal disorders, and nightmare disorders were reported. The percentages of sleep disorders in the current study were quite similar to what has been observed in other studies done elsewhere.^{5,14} According to research studies, insomnia, EDS, and RLS are present in about half of all COPD patients specifically the ones at stage three and four of the disease. As a matter of fact, COPD patients have reported insomnia as the third most common comorbid condition after locomotive disease and hypertension.¹⁵

Table 3 shows the two regression models obtained through hierarchical multiple regression to predict the criterion variable HRQoL comprising of four dimensions. The results of the final model significantly predicted the impact of sleep disorders on physical health [$F(4,145)=15.55, p<.001$], psychological health [$F(4,145)=10.13, p<.001$], social relationships [$F(4,145)=5.04, p<.001$], and environment [$F(4,145)=3.63, p<.001$] and accounted for 64%, 53%, 36%, and 29% of the variance in these variables. Gender, age, duration and COPD stages were included in the first model for the four HRQoL dimensions. Model 2 included all categories of the sleep disorders in addition to general sleep problems dimension. On the four dimensions of HRQoL, model 1 accounted for 25%, 21%, 6% and 6% of the variance, however, when the sleep disorders were included in the model, the proportion of the variance increased to 64%, 53%, 36% and 29% indicating the strong influence of sleep disorders on the COPD

Table 3: Hierarchical Multiple Regression Analysis for Sleep Disorders as Predictor of HRQoL (N=150)

Variable	Physical Health			Psychological			Social Relation			Environment		
	B	SE	β	B	SE	B	B	SE	β	B	SE	β
Model 1												
Gender	-8.49	2.95	.21**	-12.2	3.21	-.29***	-3.22	3.6	-.078	-3.71	2.41	-.13
Age	-.45	.14	-.24**	-.41	.15	-.21**	-.11	.17	-.056	-.15	.11	-.11
CopdDur	-.84	.34	-.23*	.99	.90	-.09	.92	1.01	.08	.48	.68	.06
Stage	-5.30	3.44	-.14*	-8.0	3.01	-.20**	-7.93	3.38	-.19*	-3.48	2.27	-.13
R			.50***			.46***			.25			.25
R ²			.25			.21			.06			.06
F			12.20			9.83			2.47			2.32
Model 2												
Gender	-3.04	2.31	-.08	-8.18	2.72	-.20**	2.13	3.27	.05	.10	2.31	.00
Age	-.25	.11	-.13*	-.14	.13	-.07	.16	.15	.08	-.04	.11	-.03
CopdDur	.06	.27	.02	.73	1.06	.06	.48	1.27	.04	-.04	.90	-.01
Stage	-2.97	2.56	-.12*	-.75	2.68	-.02	-.84	3.22	-.02	-.66	2.27	-.02
Insomnia	-.66	.28	-.18*	-.82	.36	-.22*	-.71	.44	-.18	-.77	.31	-.29*
Hyper	-.81	.28	-.23**	-.98	.34	-.27**	-.96	.41	-.26*	-.71	.29	-.28*
Narco	-.60	.34	-.12	-.58	.39	-.11	-.81	.47	-.19*	-.20	.33	-.05
SRBD	-.90	.32	-.19**	-.78	.38	-.16*	-.54	.45	-.11*	-.44	.32	-.13
ASPS	-.59	.44	-.08	.35	.52	.04	-.31	.62	-.04	.01	.44	.00
DSPS	-.01	.57	-.00	.16	.67	.02	-.59	.80	-.05	-.65	.57	-.09
NREM	-.86	.94	-.05	.98	1.09	.06	-1.54	1.31	-.09	-.45	.92	-.04
NightM	-2.25	.63	-.20**	.34	.75	.03	-.20	.90	-.02	-.98	.64	-.12
RBD	-.05	.69	-.00	-.14	.81	.01	-.99	.98	-.08	-.28	.69	-.03
RLS	-.53	.27	-.12*	-.15	.32	.03	-.79	.38	-.17*	-.47	.27	-.16
Gen.SP	-.68	.24	-.24**	-.64	.28	.22*	-.34	.34	-.11	.16	.24	.08
R			.80***			.73***			.60***			.54***
R ²			.64			.53			.36			.29
F			15.55			10.13			5.04			3.63

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; **Gender:** 1=male, 2=female; **CopdDur:** Duration of COPD (in years); **Stage:** stage of COPD; **Hyper:** Hypersomnia; **Narco:** Narcolepsy; **SRBD:** Sleep-related breathing disorder; **ASPS:** Advanced sleep phase type; **DSPS:** Delayed sleep phase type; **NREM:** Non-REM sleep arousal disorders; **NightM:** Nightmare disorder; **RBD:** REM sleep behavior disorder; **RLS:** Restless legs syndrome; **Gen.SP:** General sleep problems

patients. While increasing age and severity of COPD were found to contribute significantly to deteriorated physical health in the patients, duration of COPD and gender lost their impact after the inclusion of sleep disorders. Insomnia, hypersomnia, SRBD, RLS, and general sleep problems significantly predicted the different HRQL dimensions whereas, narcolepsy, circadian rhythm disorders, and RBD didn't. The relationship was inverse which indicated that an increase in the symptoms of a sleep disorder led to a deterioration in quality of life.

This finding that sleep problems significantly impact and predict deteriorated HRQoL in COPD patients corroborates prior observations where quality of sleep has been found to be the best predictor of HRQL.¹⁴ Though it is not exactly clear as to how sleep disorders affect HRQoL in COPD, studies have

shown HRQoL to be compromised in this patient group with disease progression.¹⁶ Fragmented sleep, insomnia hypersomnia, sleep apnea, RLS, and poor sleep quality are seen to further reduce HRQoL in COPD patients.^{4,17,18} Patients who experience symptoms of insomnia have elevated healthcare utilization and adverse impact on HRQoL.²⁰ RLS is another sleep disorder which is a considered a common associate of COPD. It causes EDS, fatigue, frequent headaches, depressive symptoms, anxiety, social isolation,¹⁸ and is associated with low ferritin levels and severe dyspnea worsening HRQoL significantly.¹⁹ This was also observed in the current study as RLS was found to be a significant predictor of deteriorated physical and social functioning ($p < .05$).

Along with sleep disorders, disease severity was another factor which contributed to a deteriorated

HRQoL of COPD and the results of multiple regression showed a decrease in physical functioning dimension of quality of life with an increase in the severity of COPD, again consistent with previous studies according to which sleep disturbances tend to get more severe with advancing disease and reduce HRQoL substantially.²³

Conclusion

COPD is a disease which is affected by the presence of co-morbidities. Sleep disorders either remain undiagnosed or unreported although they have a profound impact on disease management and HRQOL. The overall prevalence of sleep disorders was 31% in the current sample and sleep disorders specifically insomnia, hypersomnia, SRBD, nightmare, and RLS significantly predicted HRQoL. The findings emphasize the need to include the assessment of sleep disorders as must in the routine visits of this patient group for successful disease management. A comprehensive assessment of sleep could facilitate to diagnose and manage sleep disorders in a timely manner and improve overall wellbeing of this population.

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