RESEARCH ARTICLE

Level of sleep disorders among patients with chronic obstructive pulmonary disease

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Abstract

Objective: To measure the level of sleep disorders among patients with chronic obstructive pulmonary disease, and to see if there was any difference in terms of demographic variables and socioeconomic status.

Methods: The cross-sectional descriptive observational study was conducted from March to June 2017, and data was collected through purposive sampling from different tertiary health care centres of Faisalabad, Pakistan. Sleep-50-Urdu scale was used to measure sleep disorders among patients with chronic obstructive pulmonary disease. SPSS 21 was used for data analysis.

Results: Of the 140 respondents 70(50%) each were males and females with an overall mean age of 48.64±17.39 years. The patients had significantly high level of narcolepsy ($p<0.05$), but those from high socioeconomic status had relatively lower level of narcolepsy ($p<0.05$). Male patients and people from lower socioeconomic status also suffered from sleep apnoea and insomnia along with chronic obstructive pulmonary disease ($p<0.05$).

Conclusion: Narcolepsy along with sleep apnoea and insomnia were significantly more prevalent among chronic obstructive pulmonary disease patients from lower socioeconomic status.

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Introduction

Chronic obstructive pulmonary disease (COPD) is generally assumed to be an adult onset lung ailment that was repeatedly seen in late adults in the previous century.[1] By 2020, COPD will be the third biggest cause of mortality.[2] In the last decade, COPD was the 10th respiratory disease causing significant disability-adjusted life years (DALYs) worldwide.[3] Overall acute expansion in hospitalisations of COPD-related cases remain stable during 2002-10, defeating nearly 3.31% of all annual hospitalisations.[4] A meta-analysis stated 10% prevalence of COPD in middle-age adults.[5] COPD endures to be one of the main community health issue triggering considerable deaths in Denmark.[6] In Pakistan, biomass fuel exposure was considered for its link with COPD in females involved in cooking in rural Peshawar.[7] It was reported that there was no curative treatment available for COPD in modern medicine yet Unani compound formulations were tested for it in New Delhi.[8] Sleep dilemmas tiered third subsequent to dyspnoea and exhaustion in COPD patients.[9] Impaired sleep in COPD has been observed and credited to numerous concerns, counting cough and dyspnoea, nocturnal hypoxaemia, use of medication, and the effects of older age and comorbidities. Sleep-related hypoxaemia is typically more noticeable in rapid eye movement (REM) sleep that may be caused by underlined augmented hypoventilation.[10] According to The International Classification of Sleep Disorders — Third Edition (ICSD-3), sleep disorders are grouped into six major categories: insomnia; sleep-related breathing disorders (e.g. central sleep apnoea due to medication or substance); central disorders of hyper-somnolence (e.g. narcolepsy); circadianrhythm sleep-wake disorders; parasomnias (e.g. sleep walking and nightmare disorder); and sleep-related movement disorders (e.g. restless leg syndrome [RLS]).[11] Sleep problems in COPD patients has been addressed in literature,[12,13] but so far no significant data is available with reference to sleep disorders in COPD patients in the national context. The current study was planned to observe the level of sleep disorders among COPD patients, and to see if there was any difference in terms of demographic variables and socioeconomic status.

Subjects and Methods

The cross-sectional descriptive observational study

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was conducted from March to June 2017, and data was collected through purposive sampling from different tertiary public and private healthcare centres of Faisalabad, Pakistan. The sample consisted of outdoor patients diagnosed with COPD belonging to different cities of Punjab aged 12-75 years. Sample size was calculated using G*Power 3.9.1.2 software.[14] Post-hoc Power analysis for independent sample t-tests was run to obtain the sample power. Input parameters for one tail were; large effect size 0.5, alpha 0.05 and total sample size for each group was 70. Based on the above-mentioned assumptions, the required sample with critical t=1.66 and degree of freedom 138 contained a statistical power (1-βerr prob) of 0.90. Those included were male and female patients diagnosed with COPD and receiving regular treatment for the preceding two months. Patients with initial diagnosis and receiving first-time treatment for COPD were not excluded.

In order to measure sleep disorders, Sleep-50-Urdu, a self-reporting Likert-type rating scale, was used (range: 0-5).[15] Originally developed in the English language it was translated for the current study into Urdu language for the local population. Initially, the Urdu version was pilot-tested on 10 participants to confirm clear understanding. The scale was then administered to the actual study subjects. There are seven sleep disorder scales among nine subscales of Sleep-50-Urdu i.e. apnoea, insomnia, narcolepsy, RLS and periodic limb movement disorder (PLMD) also known as RLS_PLMD, circadian rhythm (CR), sleep walking (SW), nightmare (N). The other two scales are the factors influencing sleep (such as too much light or noise in the bedroom, smoking and sad mood), and impact of these sleep disorders on individual's life (like to feel tired, irritated, and difficulty concentrating). Responses were obtained on a 4-point basis: 1 (bad and no frequency) = not at all; and 4 (very high frequency) = very much.

Ethical approval was obtained from each hospital and verbal informed consent was obtained from each participant. Reliability analysis was performed to determine the reliability of Sleep-50-Urdu version. Descriptive statistics was used for frequencies and percentages of the study variables. Further Independent sample t-test was run to compare demographic variables across sleep disorders and vulnerable factors for sleep disorder among COPD patients.

Results

Of the 140 respondents 70(50%) each were males and females with an overall mean age of 48.64±17.39 years (Table-1). Cronbach's alpha reliability for the entire Sleep-50-Urdu was 0.87 (Table-2). Narcolepsy was the only sleep disorder that significantly existed in COPD patients ($p<0.05$). Males scored high compared to females, and

Table-1: Demographic characteristics of study sample.

Variable		Frequency
Gender	Male	70(50%)
	Female	70(50%)
Age Group	Adolescence to middle adults	74(53%)
	Late adults	66(47%)
Socioeconomic Status	Lower	16(11.4%)
	Middle	124(88.6%)
Marital Status	Married	122(87%)
	Unmarried	18(13%)

Table-2: Reliability Index, items detail, number of items, scoring range, cut-off scores and Mean values of Sub scale of Sleep-50-Urdu (N=140).

Name of Scale	Item numbers in Sleep-50-Urdu	Scoring range	Cut off scores	Mean	K	α	Corrected Item-Total Correlation
Apnoea	1,2,3,4,5,6,7,8	8-32	≥ 15	14.90	8	.66	.58
Insomnia	9,10,11,12,13,14,15,16	9-36	≥ 19	15.64	8	.68	.63
Narcolepsy	17,18,19,20,21	4-16	≥ 7	8.59	5	.61	.68
RLS_PLMD	22,23,24,25	3-12	≥ 7	7.11	4	.84	.59
Circadian Rhythm	26,27,28	3-12	≥ 8	3.66	3	.72	.49
Sleep Walking	29,30,31	3-12	≥ 7	4.54	3	.52	.68
Nightmare	32 (33-36 Filler items)	1-4	≥ 3	1.21	9	--	.46
Factors	37,38,39,40,41,42,43	7-28	≥ 14	9.59	7	.66	.39
Impact	44,45,46,47,48,49,50	7-28	≥ 14	13.46	7	.50	.42
Total sleep-50-Urdu	1-50	46-184	92	82.34	50	.87	.99

K=Number of Items, α= Cronbach's Alpha, *33-36 filler items that are not included in total score of scale & subscale.
RLS_PLMD: Restless legs syndrome and periodic limb movement disorder.

Table-3: Mean, standard deviations, t and p values, and Cohen's D of Sleep Disorders among patients with COPD with independent demographics.

Sleep Disorders	Independent variable	N	Mean	Std. D	T	P	Cohen's D
Apnoea	Male	70	15.83	4.34	2.81	.01**	.50
	Female	70	13.97	3.43			
	Lower	16	17.69	3.63	3.04	.01*	.86
	Middle	124	14.54	3.93			
Insomnia	Male	70	16.44	3.90	2.53	.01*	.42
	Female	70	14.84	3.70			
	Lower	16	17.50	2.99	2.10	.03*	.61
	Middle	124	15.40	3.86			
Narcolepsy	Lower	16	10.00	2.16	2.15	.03*	.63
	Middle	124	8.40	2.86			
RLS_PLMD	Male	70	7.69	3.03	2.30	.02*	.40
	Female	70	6.53	2.95			
	Lower	16	8.56	2.89	2.10	.04*	.56
	Middle	124	6.92	3.01			
Sleep Walking	Male	70	4.91	1.98	2.61	.01*	.44
	Female	70	4.16	1.40			
Factors	Male	70	10.40	4.74	2.30	.02*	.38
	Female	70	8.79	3.60			

Sleep Disorders	Independent variable	N	Mean	Std. D	T	P	Cohen's D
Apnoea	Adolescence to middle adults	74	14.83	3.34	2.81	.01**	.50
	Late adult	66	13.97	3.23			
	Married	122	14.69	3.73	3.04	.01*	.86
	Unmarried	18	12.54	3.93			
Insomnia	Adolescence to middle adults	74	16.44	3.80	2.53	.01*	.42
	Late adult	66	13.84	3.20			
	Married	122	17.50	2.99	2.10	.03*	.61
	Unmarried	18	14.40	4.86			
RLS_PLMD	Adolescence to middle adults	74	7.69	4.03	2.30	.02*	.40
	Late adult	66	8.53	2.95			
	Married	122	7.56	2.89	2.10	.04*	.56
	Unmarried	18	8.92	3.01			

RLS_PLMD: Restless legs syndrome and periodic limb movement disorder.

lower socioeconomic status scored high compared to high socioeconomic status ($p<0.05$ each). No significant difference was found with reference to age group ($p>0.05$). The average score was added to the mean section on all the questions and therefore the mean score was >4 (Table-3).

Discussion

Sleep-50-Urdu was found to be a highly reliable measure to assess sleep disorders among COPD patients. Only Narcolepsy was significantly present among the patients. Level of narcolepsy was significantly high among COPD patients from lower socioeconomic status ($p<0.05$). Male patients and people from lower socioeconomic status also suffered from sleep apnoea along with COPD ($p<0.05$). Current outcomes are clinically pertinent with previous findings that claimed a contribution in pathogenesis of cellular paths by systematic inflammation.[16] Overlap syndrome had prevalence of 1% in general adult population i.e. co-occurrence of obstructive sleep apnoea syndrome (OSAS) and COPD within an individual.[17] Insomnia is the leading sleep disorder for which these patients are at greater risk, but male patients from lower socioeconomic status were significantly at greater risk to suffer from insomnia ($p<0.05$). Difficulty in initiating and sustaining sleep, and insomnia were the frequently reported symptoms in patients with COPD.[18] RLS_PLMD is prevalent significantly among male patients and COPD sufferers from lower socioeconomic status ($p<0.05$). The prevalence of RLS is higher in persons with COPD than those without COPD,[19] while the association between COPD and RLS is unclear.[20]

Men have high tendency for sleep walking ($p<0.05$), yet there are minimal chances for comorbidity of sleep walking with COPD because the prevalence of sleepwalking is regularly reported higher in children compared to adults.[21] Factors that contribute in sleep problems are not significantly prevalent in this population, but males have more vulnerable factors, such as smoking, to develop sleep disorders compared to females ($p<0.05$). Literature stated that continuous positive airway pressure requirements may differ between males and females with obstructive sleep apnoea.[22]

No significant level and difference exists on CR and N as well as impact of sleep disorders in daily life of COPD patients with any demographic variable ($p>0.05$). Age group was the only demographic variable that had insignificant difference level among all sleep disorders ($p>0.05$). Overall scores were high among males which is in line with a recent retrospective study.[23] Among the Japanese, the prevalence of sleep disorders in COPD patients was greater than that in the population that is not diagnosed with chronic obstructive pulmonary disease.[24] Patients with COPD are at greater risk of developing sleep disorders and management may be considered for both conditions when reported in a clinical setting.

In terms of limitations, the study ignored the exact duration of illness of the respondents. Past history of treatment options in terms of alternative medicines also remained unaddressed. Finally, the use of non-probability sampling technique was also a limitation. Clinicians should focus on comorbidity between sleep disorders and COPD particularly while dealing with male patients with low socioeconomic status.

Conclusion

Sleep-50-Urdu was found to be a reliable measure to assess sleep disorders in local population. Narcolepsy was prevalent among COPD patients. It was significantly high among male patients from lower socioeconomic background. They also suffered from sleep apnoea and insomnia.

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Conflict of Interest: None.

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References

1. Fletcher C, Peto R. The natural history of chronic airflow obstruction. Br Med J. 1977;1:1645-8.
2. Faul F, Erdfelder E, Buchner A, Lang A-G. Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. Behav Res Methods. 2009;41:1149-60.
3. Cavaillès A, Brinchault-Rabin G, Dixmier A, Goupil F, Gut-Gobert C, Marchand-Adam S, et al. Comorbidities of COPD. European Respiratory Review. 2013;22:454-75.
4. WHO. Chronic Respiratory. 2008;12–36. NOT FOUND
5. Jinjuvadia C, Jinjuvadia R, Mandapakala C, Durairajan N, Liangpunsakul S, Soubani AO. Trends in outcomes, financial burden, and mortality for acute exacerbation of chronic obstructive pulmonary disease (COPD) in the United States from 2002 to 2010. COPD: J Chron Obstr Pulmonary Dis. 2017;14:72-9.
6. Halbert R, Natoli J, Gano A, Badamgarav E, Buist AS, Mannino D. Global burden of COPD: systematic review and meta-analysis. Eur Respir J. 2006;28:523-32.
7. Lash TL, Johansen MB, Christensen S, Baron JA, Rothman KJ, Hansen JG, et al. Hospitalization rates and survival associated with COPD: a nationwide Danish cohort study. Lung. 2011;189:27-35.
8. Akhtar T, Ullah Z, Khan MH, Nazli R. Chronic bronchitis in women using solid biomass fuel in rural Peshawar, Pakistan. Chest. 2007;132:1472-5.
9. Zaidi S, Ahmad M, Aslam K, Rauf A, Mukherjee A. Clinical study to evaluate the efficacy of a compound Unani herbal formulation Sharbat-e-Unsul Murakkab in Sual-e-Muzmin (chronic bronchitis). Austr J Med Herbalism. 2010;22:89.
10. Valipour A, Lavie P, Lothaller H, Mikulic I, Burghuber OC. Sleep profile and symptoms of sleep disorders in patients with stable mild to moderate chronic obstructive pulmonary disease. Sleep Med. 2011;12:367-72.
11. McNicholas WT. Sleep in chronic obstructive pulmonary. Management Chron Obstruct Pulmon Dis. 2006;38:325.
12. Sateia MJ. International classification of sleep disorders. Chest. 2014;146:1387-94.
13. Shorofsky M, Bourbeau J, Kimoff R, Ayas N, Tan WC, Aaron SD, et al. A Population Based Study Of Sleep Disorders In Chronic Obstructive Pulmonary Disease: Sleep Quality And Acute Exacerbations Of COPD. C78 NOT STRANGERS IN THE NIGHT: SLEEP AND THORACIC DISEASES: American Thoracic Society; 2016, pp A5995-A.
14. Divo M, Cote C, de Torres JP, Casanova C, Marin JM, Pinto-Plata V, et al. Comorbidities and risk of mortality in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2012;186:155-61.
15. Spoormaker VI, Verbeek I, van den Bout J, Klip EC. Initial validation of the SLEEP-50 questionnaire. Behav Sleep Med. 2005;3:227-46.
16. McNicholas WT. Chronic obstructive pulmonary disease and obstructive sleep apnea: overlaps in pathophysiology, systemic inflammation, and cardiovascular disease. Am J Respir Crit Care Med. 2009;180:692-700.
17. Pronzato C. Chronic obstructive pulmonary disease and obstructive sleep apnea. Association, consequences and treatment. Monaldi Arch Chest Dis. 2010; 73:155-61.
18. Valipour A, Lavie P, Lothaller H, Mikulic I, Burghuber OC. Sleep profile and symptoms of sleep disorders in patients with stable mild to moderate chronic obstructive pulmonary disease. Sleep Med. 2011;12:367-72
19. Coco DL, Mattaliano A, Coco AL, Randisi B. Increased frequency of restless legs syndrome in chronic obstructive pulmonary disease patients. Sleep Med. 2009;10:572-6.
20. Budhiraja R, Siddiqi TA, Quan SF. Sleep disorders in chronic obstructive pulmonary disease: etiology, impact, and

management. J Clin Sleep Med. 2015;11:259-70.
21. Zadra A, Pilon M. NREM parasomnias. Handb Clin Neurol. 99: Elsevier; 2011. p. 851-68.
22. Ralls FM, Grigg-Damberger M. Roles of gender, age, race/ethnicity, and residential socioeconomics in obstructive sleep apnea syndromes. Curr Opin Pulm Med. 2012;18:568-73.
23. Budhiraja R, Roth T, Hudgel DW, Budhiraja P, Drake CL. Prevalence and polysomnographic correlates of insomnia comorbid with medical disorders. Sleep. 2011;34:859-67.
24. Ito K, Kawayama T, Shoji Y, Fukushima N, Matsunaga K, Edakuni N, et al. Depression, but not sleep disorder, is an independent factor affecting exacerbations and hospitalization in patients with chronic obstructive pulmonary disease. Respirology. 2012;17:940-9.