CLINICAL CHARACTERISTICS AND ASSOCIATED FACTORS OF INSOMNIA AMONG COPD OUTPATIENTS AT BACH MAI HOSPITAL 2024 - 2025

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Sleep disorders, particularly insomnia, are common in patients with Chronic Obstructive Pulmonary Disease (COPD) and significantly impact their quality of life. This study aimed to identify independent factors of insomnia in COPD patients. We conducted a cross-sectional study of 118 COPD outpatients at the Outpatient Department of Bach Mai Hospital. Insomnia was diagnosed using DSM-5 criteria, and multivariable modified Poisson regression was applied to estimate adjusted prevalence ratios (aPR). The prevalence of insomnia in this cohort was 44.1% (52/118). Multivariable analysis revealed that active respiratory symptoms, particularly current cough (aPR = 3.01; 95% CI: 1.57–5.77; p = 0.001) and dyspnea (aPR = 2.73; 95% CI: 1.78–4.18; p < 0.001). In contrast, the use of SABA (aPR = 0.54; 95% CI: 0.33–0.89; p = 0.015) and SAMA (aPR = 0.50; 95% CI: 0.28–0.89; p = 0.018) were associated with a reduced prevalence of insomnia. These findings suggest that current respiratory symptom burden is a major correlation of insomnia in COPD outpatients, while short-acting bronchodilator use may be associated with a lower prevalence of sleep disturbance.

Keywords: Chronic Obstructive Pulmonary Disease, insomnia, sleep disturbances, short-acting bronchodilators.

I. INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) represents a profound global health burden, standing in top ten leading causes of death worldwide. While traditionally viewed primarily through the lens of progressive airflow limitation, contemporary medical paradigms increasingly recognize COPD as a complex systemic syndrome with substantial psychiatric and neurobiological comorbidities. Among these, sleep disturbances, most notably insomnia- are remarkably pervasive yet systematically under-recognized and under-treated in routine outpatient practice. Epidemiological evidence indicates that the prevalence of clinical insomnia among individuals with COPD ranges broadly from 16.9% to 44.0%, a rate disproportionately higher than that observed in age-matched healthy cohorts.[1]

The clinical implications of comorbid insomnia in COPD are severe and bidirectional. Disruption of sleep architecture not only drastically diminishes health-related quality of life but also triggers a detrimental pathophysiological cascade. Chronic sleep deprivation exacerbates systemic inflammation, impairs immune responses, and heightens sympathetic nervous system activity, worsening of infection, thereby independently increasing the risk of acute COPD exacerbations.[2] The

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etiology of insomnia in this demographic is highly multifactorial. It is driven by nocturnal physiological alterations, such as transient hypoxia and hypercapnia, distressing physical symptoms including persistent cough and nocturnal dyspnea, and the adverse effects of essential pharmacological treatments like corticosteroids and bronchodilators.[3]

Despite the well-documented impact of insomnia on COPD trajectories globally, there is a distinct paucity of localized research within the Vietnamese healthcare context. There are few studies in Viet Nam about sleep disorders among COPD patients. A study using type 3 sleep monitoring device at some Vietnamese sleep labs (Bach Mai hospital) shows that the prevalence of obstructive sleep apnea among COPD patients is 42.1%.[4] Another study conducted by Phan Thi Thu et al at Bach Mai Hospital shows the prevalence of sleep disorders among COPD patients screened by PSQI is 69.7%.[5] Respiratory Center of Bach Mai Hospital is highly specialized at treating COPD patients and those mentioned studies have presented the severity of sleep disorders among this specific group. However, they lack of thorough description about insomnia among COPD patients, especially the clinical psychiatric diagnosis of insomnia.

As a result, these results show the significant association between COPD and insomnia, but studies in Viet Nam in some large respiratory centers (Bach Mai Hospital) do not mention thoroughly about the prevalence and associated factors of insomnia among COPD patients. Addressing this literature gap is imperative for the evolution of a multidisciplinary care model that seamlessly integrates respiratory medicine with psychiatric support. Therefore, this study is conducted to address the following objectives:

- To describe the clinical characteristics of insomnia among outpatients diagnosed with COPD at Bach Mai Hospital.

- To identify the associated factors with insomnia in this patient population.

II. MATERIALS AND METHODS

1. Subjects

Inclusion criteria

Patients with COPD diagnosed by respiratory doctors based on the diagnostic criteria of the 2023 Global Strategy for Chronic Obstructive Pulmonary Disease (GOLD) were being treated on an outpatient basis at Bach Mai Hospital.

Exclusion criteria

Patients and their families did not consent to participate in the study or voluntarily withdraw from the study; patients had limited communication abilities due to illiterate education or hearing and speech impairments; patients were suffering from serious, life-threatening illnesses; patients had a history of other psychiatric disorders.

2. Methods

Study methods

This is a cross-sectional study.

Sample selection and sample size: Patients diagnosed with COPD according to the GOLD 2023 criteria by respiratory doctors are currently receiving outpatient treatment at Bach Mai Hospital. A total of 118 patients participated in the study and completed the full questionnaire.

Study location

This study was conducted in Outpatient Department, Bach Mai Hospital

Sampling time

This study started to recruit participants from December 2024 to February 2025.

Study tools

This study applied diagnostic criteria of insomnia disorder (307.42) according to Diagnostic and statistical manual of mental disorders 5th edition (DSM-5) to. DSM-5 was a mental disorder classification published by the American Psychiatric Association in 2013.

Accordingly, patients could be diagnosed with insomnia disorder if they had predominant complaint of dissatisfaction with sleep quantity or quality, manifested by difficulty initiating sleep, maintaining sleep, or early-morning awakening with inability to return to sleep. These symptoms must cause clinically significant distress or impairment in important areas of functioning, occur at least three nights per week, and persist for a minimum of three months despite adequate opportunity for sleep. The disturbance should not be better explained by another sleep-wake disorder, the physiological effects of substances, or coexisting mental or medical conditions.[6]

Research variables

Socio-demographic characteristics: age evaluated as a continuous variable (mean ± sd) and categorized into three groups (40-64 years old, 65-79 years old, ≥ 80 years old), gender (male/female), occupation (agriculture/ farmer, factory worker, retired, freelancer/self-employed); BMI (classified according to WHO criteria for Asian populations (< 23 kg/m² and ≥ 23 kg/m²).

Behavioral factors: history of tobacco use (yes/no), history of alcohol use (yes/no).

COPD - related clinical characteristics: duration of COPD (<10 years / ≥10 years); current respiratory symptoms: current cough (yes/no), sputum production (yes/no), current dyspnea (yes/no); current respiratory medication: SABA (yes/no), SAMA (yes/no), LAMA (yes/no).

Medical comorbidities: history of cardiovascular disease (yes/no); history of endocrine disease (yes/no); history of renal/ urological disease (yes/no).

Sleep and insomnia characteristics: presence of insomnia (yes/no); specific insomnia symptoms (difficulty initiating sleep/ difficulty maintaining sleep/ early morning awakening/ complete insomnia); time to fall asleep (15-30 minutes; 31-60 minutes; > 60 minutes); times waking up during the night (1, 2, 3, or 4 times); total nocturnal sleep duration (< 5 hours, 5 to < 6 hours, 6 to < 7 hours, ≥ 7 hours).

Data collection

The study enrolled COPD outpatients treated at Bach Mai Hospital. Demographic and clinical data were collected through face-to-face interviews with patients and their families, supplemented by medical record reviews. Sleep disorders were clinically diagnosed based on DSM-5 criteria. To maximize diagnostic validity, the assessment utilized a multidisciplinary approach, cross-validating findings through consultations of respiratory doctors and psychiatrists.

Analysis methods

All statistical analyses were conducted using Stata 15.1. Baseline characteristics were summarized using descriptive statistics. Pearson's Chi-square or Fisher's exact tests were applied to compare categorical variables. To identify associated factors of insomnia, a multivariable modified Poisson regression model with robust error variance was utilized. This modeling strategy was selected because insomnia had a relatively high prevalence in the study population (44%); under such circumstances, odds ratios estimated from logistic regression may meaningfully overstate the strength of association relative to prevalence ratios. This specific modeling approach was

purposefully selected to directly estimate adjusted prevalence ratios (aPR) and 95% confidence intervals (CI), thereby circumventing the overestimation of relative risk inherent to logistic regression when the outcome is highly prevalent. Statistical significance was defined as a two-tailed p-value < 0.05.

3. Research ethics

This is a cross-sectional study, not interfering with the doctors' treatment methods. The study was conducted with the consent of the patients and their families; participants could withdraw from the study at any time without any hindrance or harm. The study was approved by the research protocol committee of Hanoi Medical University according to Decision No. 452/QD-DHYHN, Department of Psychiatry, Hanoi Medical University. Information provided by the study participants is guaranteed to be encrypted and kept confidential.

III. RESULTS

Table 1. General characteristics of the study population (n=118)

Characteristics		Frequency (n)	Percentage (%)
Socio-demographic characteristics			
Age		70.57 ± 7.79 years old	
Gender	Male	113	95.8
	Female	5	4.2
Age group	40-64 years old	22	18.6
	65-79 years old	82	69.5
	≥ 80 years old	14	11.9
History of alcohol use		38	32.2
History of tobacco use		55	46.6
BMI classification	< 23 kg/m^2	91	77.1
	≥ 23 kg/m^2	27	22.9
COPD characteristics			
Duration of COPD	<10 years	63	53.4
	≥ 10 years	55	46.6
Current symptoms	Cough	72	61.0
	Sputum production	62	52.5
	Dyspnea	25	21.2
Medical comorbidities	Cardiovascular	61	51.7
	Endocrine	33	28.0
	Renal - urological	15	12.7
	Gastrointestinal	6	5.1
	Musculoskeletal	4	3.3

Characteristics		Frequency (n)	Percentage (%)
Maintenance medications	SABA	115	97.5
	LABA	112	94.9
	ICS	107	90.7

The mean age was 70.57 ± 7.79 years old, with a majority of male participants (95.8%). Regarding COPD, 53.4% had the disease for less than 10 years, with common symptoms including cough (61.0%) and sputum production (52.5%). Most participants were treated with SABA (97.5%), LABA (94.9%), and ICS (90.7%).

Table 2. Distribution of insomnia according to general characteristics and clinical symptoms

Characteristics		Insomnia (n=52)	No insomnia (n=66)	p-value
Gender, n (%)	Male	50 (44.2)	63 (55.8)	0.851[a]
	Female	2 (40.0)	4 (60.0)	
Age group, n (%)	40-64 years old	9 (40.9)	13 (59.1)	0.395[b]
	65-79 years old	39 (47.6)	43 (52.4)	
	≥ 80 years old	4 (28.6)	10 (71.4)	
BMI classification, n (%)	< 23 kg/m^2	35 (38.5)	56 (61.5)	**0.024[b]**
	≥ 23 kg/m^2	17 (63.0)	10 (37.0)	
History of alcohol use, n (%)	Yes	24 (63.2)	14 (36.8)	**0.004[b]**
	No	28 (35.0)	52 (65.0)	
History of tobacco use, n (%)	Yes	33 (60.0)	22 (40.0)	**0.001[b]**
	No	19 (30.2)	44 (69.8)	
Duration of COPD, n (%)	<10 years	21 (33.3)	42 (66.7)	**0.012[b]**
	≥ 10 years	31 (56.4)	24 (43.6)	
Cough, n (%)	Yes	45 (62.5)	27 (37.5)	**<0.001[b]**
	No	7 (15.2)	39 (84.8)	
Dyspnea, n (%)	Yes	17 (68.0)	8 (32.0)	**0.007[b]**
	No	35 (37.6)	58 (62.4)	
Sputum production, n (%)	Yes	28 (45.2)	34 (54.8)	0.801[b]
	No	24 (42.9)	32 (57.1)	

Note:

[a]: Fisher's exact test, [b]: Chi-squared test, p<0.05 was bolded

Insomnia is prevalent in 44.2% of the study population. Insomnia is more common in individuals with a BMI ≥ 23 kg/m² (63.0%), a history of alcohol (63.2%) and tobacco use (60.0%), and longer COPD duration (56.4%). Additionally, insomnia is related with current symptoms of cough (62.5%) and dyspnea (68.0%). All these differences being statistically significant ($p < 0.05$).

Table 3. Clinical symptoms of insomnia in the study population (n=118)

Insomnia characteristics	Frequency (n)	Percentage (%)
Difficulty maintaining sleep	73	61.9
Difficulty initiating sleep	65	55.1
Early morning awakening	35	29.7
Complete insomnia	6	5.1
Time to fall asleep (minutes)		
15-30	45	42.9
31-60	45	42.9
>60	15	14.3
Times waking up during the night		
1	30	25.4
2	33	28.0
3	42	35.6
4	13	11.0
Total nocturnal sleep duration		
≥ 7 hours	57	48.3
6 to < 7 hours	13	11.0
5 to < 6 hours	15	12.7
< 5 hours	33	28.0

The most common symptom is difficulty maintaining sleep (61.9%). Regarding the time to fall asleep, most participants take 15-60 minutes to fall asleep, with equal proportions of those taking 15-30 minutes and 31-60 minutes (42.9% each). In terms of waking up during the night, the most common occurrence is waking up 3 times (35.6%).

Table 4. Multivariable Poisson regression analysis for occupational, comorbid, and pharmacological factors associated with insomnia (n = 118)

Factors		aPR	95% CI
BMI classification	< 23 kg/m²	Ref.	-
	≥ 23 kg/m²	1.31	0.86 - 1.99

Factors		aPR	95% CI
Occupation	Agriculture / farmer	Ref.	-
	Factory worker	1.85	0.90 - 3.82
	Retired	0.74	0.43 - 1.28
	Freelancer / self-employed	1.02	0.52 - 2.00
Current Cough	No	Ref.	-
	Yes	3.01	1.57 - 5.77
Current Dyspnea	No	Ref.	-
	Yes	2.73	1.78 - 4.18
Cardiovascular disease	No	Ref.	-
	Yes	1.18	0.71 - 1.95
Medication: SABA	No	Ref.	-
	Yes	0.54	0.33 - 0.89
Medication: SAMA	No	Ref.	-
	Yes	0.50	0.28 - 0.89
Medication: LAMA	No	Ref.	-
	Yes	0.91	0.26 - 3.22

Note: aPR: adjusted prevalence ratio; CI: confidence interval;
Ref. : reference value. Bolded values were statistically significant

The results of the multivariable Poisson regression analysis indicate that several clinical and treatment-related factors are associated with insomnia among COPD outpatients. Current cough and current dyspnea were significantly associated with insomnia. Specifically, patients with current cough had a prevalence of insomnia approximately 3.01 times higher than those without cough (aPR = 3.01; 95% CI: 1.57-5.77). Similarly, patients with current dyspnea had a 2.73-fold higher prevalence of insomnia compared to those without dyspnea (aPR = 2.73; 95% CI: 1.78-4.18). Regarding treatment-related factors, the use of SABA and SAMA was inversely associated with insomnia. Patients receiving SABA had a lower prevalence of insomnia compared to those not receiving SABA (aPR = 0.54; 95% CI: 0.33-0.89). A similar pattern was observed for SAMA use (aPR = 0.50; 95% CI: 0.28-0.89).

IV. DISCUSSION

Our study showed that insomnia is a common and clinically meaningful problem among outpatients with COPD. Specifically, the prevalence of insomnia among COPD patients in our research was 44.2% and characterized predominantly by difficulty maintaining sleep (61.9%), followed by difficulty initiating sleep (55.1%), indicating that sleep fragmentation and impaired sleep continuity may be the most prominent features of sleep disturbance in these patients. This finding is broadly consistent with the existing literature, which has shown that sleep disturbance is a common manifestation in

patients with COPD. A 2023 meta-analysis by Dongru Du et al reported that the prevalence of insomnia among patients with COPD was approximately 29.5%, while a 2023 study by Luyster et al in United States involving 1,011,646 patients with COPD found that nearly 40% had a diagnosis of insomnia.[1,7] Difficulty maintaining sleep in patients with COPD may be explained primarily by sleep fragmentation resulting from the burden of nocturnal respiratory symptoms. According to a review by McNicholas et al in 2013, sleep in patients with COPD is frequently disrupted by recurrent awakenings, reduced sleep efficiency, and decreased time spent in deep sleep and rapid eye movement (REM) sleep. The underlying mechanisms include sleep-related hypoventilation, increased ventilation-perfusion mismatch, reduced functional residual capacity, and diminished responsiveness of the respiratory center as well as the accessory respiratory muscles, particularly during REM sleep, thereby exacerbating nocturnal hypoxemia.[8]

Among the dependent variables, cough (aPR = 3.01; 95% CI: 1.57-5.77) and dyspnea (aPR = 2.73; 95% CI: 1.78-4.18) demonstrated the most meaningful associations with insomnia, underscoring the significant role of active respiratory symptom burden in the development and persistence of sleep disturbance in COPD. From a respiratory perspective, cough, sputum production, wheezing, and dyspnea may prevent patients from achieving the state of relaxation necessary for the transition from wakefulness to sleep. Moreover, during sleep onset, the reduction in wakefulness drive and the decline in activity of the accessory respiratory muscles may further impair ventilation and gas exchange, rendering respiratory discomfort more pronounced in some patients with COPD.[8,9] In contrast, the use of SABA (aPR = 0.54; 95% CI: 0.33-0.89) appeared to be associated with a lower likelihood of insomnia, raising the possibility that better short-term control of respiratory symptoms may contribute to improved sleep in this population. This observation appears counterintuitive from a pharmacological perspective, as SABA agents such as salbutamol may induce tremor, palpitations, nervousness, and insomnia.[10] Nevertheless, in the context of COPD, a plausible explanation is that the acute bronchodilator benefit of SABA may outweigh its potential stimulant adverse effects in some patients. By relieving nocturnal bronchospasm, dyspnea, and the sensation of chest tightness, SABA use may reduce symptom-driven nocturnal awakenings and facilitate the resumption of sleep.[11] This interpretation is broadly compatible with the literature emphasizing the clinical importance of nocturnal symptom control in COPD.[12]

Our findings of this study should be considered within the context of its cross-sectional design, relatively modest sample size, and predominantly male study population, which may affect causal interpretation and the generalizability of the results. At the same time, the study is strengthened by the use of multivariable regression to address potential confounding and by its relatively comprehensive evaluation of factors associated with insomnia in patients with COPD.

V. CONCLUSION

This study found that the prevalence of insomnia among COPD outpatients treated at Bach Mai Hospital was 44.2% with the most popular symptoms were difficulty in maintaining sleep (61.9%) and difficulty in falling asleep (55.1%).

The associated factors of insomnia among these patients included of current cough (aPR = 3.01; 95% CI: 1.57-5.77), current dyspnea

(aPR = 2.73; 95% CI: 1.78-4.18), SABA using (aPR = 0.54; 95% CI: 0.33-0.89), SAMA using (aPR = 0.50; 95% CI: 0.28-0.89).

These findings suggested that insomnia was a common disorder among COPD patients. Consequently, sleep assessment should be incorporated into routine outpatient COPD care, particularly in patients with prominent cough and dyspnea.

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