Original research article

OPEN ACCESS

Prevalence and risk factors of depression in patients with chronic obstructive airway disease: a tertiary care hospital, outpatient setting

Seksan Chaisuksant[1], Panupong Suwannatat[1], Kittisak Sawanyawisuth[2]

[1]Department of Medicine, Khon Kaen Hospital, Khon Kaen, Thailand; [2]Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

ABSTRACT

Background: Chronic obstructive airway disease (COPD) has been found to be associated with depression. An overlap of COPD and depression may cause poor quality of life and an increase in mortality. A meta-analysis found that the prevalence and risk factors of depression in patients with COPD have high heterogeneity and are limited in tertiary care hospital outpatient settings. This study thus aimed to evaluate the prevalence and risk factors of depression in patients with COPD using personal data in a tertiary care hospital outpatient setting.

Methods: This cross-sectional study included adult patients who were diagnosed with COPD according to the GOLD guidelines, had stable functional status within the past 4 weeks with the same treatment regimen, and had no history of other serious medical or surgical illness. A diagnosis of depression was made according to a score of 11 or higher on the hospital anxiety and depression scale (HADS). The prevalence and predictors of depression were then computed.

Results: The study enrolled and evaluated 150 patients with COPD, out of which 6 (4%) had depression. While the predictive model for depression comprised two factors, only severity of COPD was independently associated with depression. The adjusted odds ratio of severity of COPD was 5.20 (95% confidence interval of 1.75, 15.42; p = 0.003).

Conclusion: The prevalence of depression in patients with COPD in a tertiary care outpatient setting was low, at 4%. According to the study's comprehensive assessment, severity of COPD was the only factor associated with depression in patients with COPD.

Key words: COPD; depression; predictor; severity

Introduction

Chronic obstructive airway disease (COPD), mainly caused by smoking, is a respiratory disease related to several diseases such as obstructive sleep apnea, and psychiatric diseases [1–5]. In one study, compared with 39,431 controls, 39,587 patients with COPD had a higher risk of depression, with an odds ratio of 2.81 (95% confidence interval of 1.69, 4.66) [2]. A systematic review including three studies found that patients with COPD who had depression had a significantly lower quality of life (pooled r = 0.48; p < 0.001) at one year follow up [6].

Correspondence: Kittisak Sawanyawisuth, 123 Mitraparp Road, Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, 40002, Thailand. Email: kittisak@kku.ac.th Tel: 66-43-363664.

Contributions: SC and PS participated in the design of the study, the facilitation for data collection and interpretation of data. SC and KS analyzed data. SC contributed to quality control of data; drafted the manuscript, while all authors have made contributions to revisions of the manuscript. All the authors read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Ethics approval and consent to participate: The study protocol was approved by the institutional board review, Khon Kaen Hospital, Khon Kaen, Thailand (KEF60208). All participants signed a written informed consent to participate prior to the study.

Consent for publication: Written informed consent for the publication of study results was obtained from all participants.

Availability of data and material: The data used to support the findings of this study are available from the corresponding author upon request.

Conflict of interest: The authors declare that they have no competing interests, and all authors confirm accuracy.

Funding: None.

Several studies have found that depression worsens the quality of life in patients with COPD in the mental health category [7,8]. Additionally, being depressed is associated with uncontrolled COPD, with an odds ratio of 2.2 (95% confidence interval of 1.7, 2.8) [9].

The prevalence of depression in patients with COPD has been reported to be 24.6% (95% confidence interval of 20.0-28.6), with a range of 0–42% [10–12]. In patients with COPD, being depressed increased the risk of COPD exacerbation by 2.06 times (95% confidence interval 1.28, 3.31) and mortality by 1.27 times, as well as poor quality of life [13]. Early screening and treatment for depression may be crucial to improve the quality of life and outcomes of patients with COPD [11]. On the other hand, patients with COPD have a 2.81 higher chance of being depressed than matched controls (95% confidence interval 1.69, 4.66) [11]. A database study from Taiwan found that older age, female sex, income, and hospitalization were risk factors for depression in patients with COPD [14]. However, this study did not include personal risk factors such as symptoms or severity of COPD. Several studies have found that personal factors are related with depression, including living alone, using home oxygen therapy, and the COPD Assessment Test (CAT) [15–17]. Having a CAT score of more than 20 was found to increase risk of depression by 7.88 times [17]. A meta-analysis and review found that the prevalence and risk factors of depression in patients with COPD have large heterogeneity (I^2 of 89%) within the limited setting of tertiary care hospitals [11,18]. Given this background, this study aimed to evaluate the prevalence and risk factors of depression in patients with COPD using personal data in a tertiary care hospital outpatient setting.

Methods

This cross-sectional study was conducted at a COPD clinic at Khon Kaen Hospital in Khon Kaen, Thailand. The inclusion criteria were adult patients who were diagnosed with COPD according to the GOLD guidelines, had stable functional status within the past 4 weeks with the same treatment regimen, and had no history of other serious medical or surgical illnesses. Those who had been previously diagnosed with depression, had been treated at the clinic for less than 2 weeks, had any active medical, surgical, or psychiatric diseases, or had been treated with lung surgery or lung transplant were excluded. The study period was between February and March 2020. This study was a part of the psychiatric conditions in patients with COPD project, IRB approval no. KEF60208, at Khon Kaen Hospital, Thailand.

Eligible patients were asked to complete a questionnaire. The questionnaire comprised three parts: baseline characteristics, severity of COPD, and a depression questionnaire. Baseline characteristics included age, sex, education, occupation, income, smoking status, living status, onset of COPD diagnosis, comorbid diseases, and body mass index. Smoking status was categorized as non-smoker, current smoker, or previous smoker. The non-smoker status was defined as having never smoked or having smoked fewer than 100 cigarettes in a respondent's lifetime, while the current smoker status was defined as having smoked more than 100 cigarettes during the respondent's lifetime and still smoking. Those who had smoked more than 100 cigarettes during their lifetime but currently did not were categorized as previous smokers.

Severity of COPD was divided into group A, B, C, and D according to the number of exacerbations per year, number of exacerbations requiring hospitalization per year, dyspnea according to the modified medical research council dyspnea score (mMRC) [19]. Data regarding knowledge about pulmonary rehabilitation was also collected. Finally, the third part of the questionnaire was the hospital anxiety and depression scale (HADS) [20].This questionnaire comprised 7 items on a 3-point Likert scale. The total possible score of the questionnaire for anxiety or depression was 21 points. A score of 11 or more indicates a valid case of depression, with a sensitivity of 85.71% for the validated Thai version of the HADS [21,22]. Additionally, clinical data regarding treatment and COPD status were recorded from participants' medical charts. The primary outcome of this study was the presence of depression.

To calculate sample size, the study took as a baseline the previously reported 30% prevalence of depression in patients with COPD [23]. There were 240 patients treated at the COPD clinic, so using a

confidence interval of 95%, the required sample size was 138 patients.

For statistical analysis, eligible patients were divided into two groups according to the outcome: those with depression and those without. The studied variables were reported as mean (SD) for numerical variables and number (percentage) for categorical variables. Inferential statistics were used to compare the studied variables between those with depression to those without. Factors associated with depression were calculated by using logistic regression analysis. A univariate logistic regression analysis was used to calculate the p value and unadjusted odds ratio for the studied variables. Factors were input into the multiple logistic regression analysis using the backward method to provide the best model [24]. The factors remaining in the predictive model were those with a p of less than 0.20. All analyses were performed using STATA software (College Station, Texas, USA).

Results

There were 151 patients with COPD who met the study criteria. One patient was excluded due to having pulmonary tuberculosis. In total, 150 patients with COPD were enrolled and evaluated. There were 6 patients (4.0%) who had depression. Only one factor was significantly different between those with and without depression (Table 1): severity of COPD. The depression group had a significantly higher proportion of patients with grade-D COPD than those without depression. Grade-D severity of COPD was found more in those with depression than those without (50.0% vs 0.0%; p = 0.003). Notably, a smaller proportion of those with depression lived with their family compared to those without depression (66.7% vs. 91.0%; p = 0.052).

The predictive model for depression thus comprised two remaining factors: living with family and severity of COPD (Table 2). However, only severity of COPD was independently associated with depression. The adjusted odds ratio of severity of COPD was 5.20 (95% confidence interval of 1.75, 15.42; p = 0.003). Living with family members had an adjusted odds ratio of 4.30 (95% confidence interval of 0.53, 34.50; p = 0.169).

Discussion

This study found that only 4% of patients with COPD met the criteria for depression in a tertiary care hospital outpatient setting. The low rate of depression in patients with COPD in this setting may be explained by the diagnostic criteria. This study used a cutoff point of 11 on the HADS to indicate depression, which has a relatively low sensitivity, at 56.0%, but high specificity, at 92.1% [25]. When using a cutoff point of 8 on the HADS, a study from China found the prevalence of depression among COPD patients to be 13.65% [26]. However, the original study of HADS suggested using a score of 11 to indicate definite cases of depression [21]. Interestingly, a meta-analysis found that the prevalence of depression in patients with COPD ranged from 0% to 42%, with a heterogeneity level of 89% [12,18].

This study found that only severity of COPD was an independent factor for being depressed, with an adjusted odds ratio of 5.20 (Table 2). A population-based study from China found that patients with stage III-IV COPD were significantly affected with depression (p < 0.001) [26]. The present study used a more comprehensive assessment of COPD: the ABCD assessment tool. Half of the patients who met the criteria for depression were in category D (Table 2). The Chinese study explained that COPD patients may experience depression due to poor lung function. This present study added that depression in patients with COPD may be due to poor lung function, the number of exacerbations, and COPD symptoms. Another study found that high CAT score or symptom score (included in the ABCD tool) is associated with depression in patients with COPD [17].

As there are heterogeneities of risk factors for being depressed in patients with COPD [18], we compared our study with other two studies conducted in tertiary care settings [27,28]. Both of these previous studies found that symptoms were associated with depression. In one study, the depressed group had significantly higher dyspnea scores (2.6 vs 1.7; p < 0.001) than the non-depressed group [27], while another study found that the daily living scale had an adjusted odds ratio of 1.1 (95% confidence interval of 1.02, 1.2) for being depressed. Once again, the present study

Table 1. Baseline characteristics, severity, and treatment of patients with chronic obstructive pulmonary disease (COPD) categorized by presence of depression.

Factors	No depression n = 144	Depression n = 6	p
Mean (SD) age, years	62.6 (4.8)	66.2 (6.1)	0.913
Male sex	134 (93.0)	5 (83.3)	0.801
Education: college or higher	8 (5.5)	0	0.613
Occupation: farmers	40 (27.8)	1 (16.7)	0.258
Income, Baht per month			
< 15,000	134 (93.0)	6 (100)	0.930
15,000-30,000	8 (5.6)	0	
30,000-50,000	1 (0.7)	0	
> 50,000	1 (0.7)	0	
Smoking status			
Never	14 (9.7)	1 (16.7)	0.267
Current smokers	2 (1.4)	1 (16.7)	
Previous smokers	128 (88.9)	4 (66.7)	
Living status			
With family	131 (91.0)	4 (66.7)	0.052
Alone	13 (9.0)	2 (33.3)	
Mean (SD) age onset of COPD, years	59.4 (9.1)	61.0 (7.6)	0.751
Co-morbid diseases			
Hypertension	31 (21.5)	2 (33.3)	0.464
Dyslipidemia	2 (1.4)	0	0.771
Diabetes mellitus	11 (7.6)	0	0.482
Gout	9 (6.2)	0	0.528
Chronic kidney disease	2 (1.4)	0	0.771
Body mass index, kg/m^2			
<18.5	29 (20.1)	0	0.205
18.5-22.9	71 (49.3)	6 (100)	
23-24.9	18 (12.5)	0	
25-29.9	21 (14.6)	0	
> 30	5 (3.5)	0	
Severity of COPD			
A	59 (47.9)	1 (16.7)	0.003
B	57 (39.6)	2 (33.3)	
C	18 (12.5)	0	
D	0	3 (50.0)	
Current medication			
Salmeterol/fluticazone	129 (89.6)	5 (83.3)	0.627
Budesonide	1 (0.7)	0	0.838
Tiotropium	6 (4.2)	2 (33.3)	0.304
Berodual	92 (63.9)	3 (50.0)	0.956
Salbutamol	4 (2.8)	1 (16.7)	0.063
Theophylline	88 (61.1)	4 (66.7)	0.784
Pulmonary rehabilitation	74 (51.4)	3 (50.0)	0.310

Note. Data presented as number (percentage) unless indicated otherwise.

Table 2. Factors associated with depression in patients with chronic obstructive pulmonary disease (COPD) by logistic regression analysis.

Factors	Unadjusted odd ratio (95% confidence interval)	p	Adjusted Odd ratio (95% confidence interval)	p
Living with family	5.03 (0.84 -30.19)	0.077	4.30 (0.53 - 34.50)	0.169
Severity of COPD	5.54 (1.89 - 16.25)	0.002	5.20 (1.75 - 15.42)	0.003

Note. Data univariate association as determined by logistic regression model backward method: sex, age, body mass index, education, living status, smoking status, onset of COPD, co-morbid diseases, current medication, severity of COPD, and pulmonary rehabilitation.

showed a more comprehensive assessment related to depression in patients with COPD. The two previous studies also found that female sex was associated with depression. Female patients had a higher prevalence of depression compared with male patients (8.8% vs 1.3%; p = 0.044). However, we did not find this association. We input sex in the backward logistic regression analysis, which is more robust than the descriptive statistics used in the previous study, and sex was not retained in the predictive model (Table 2).

There are some limitations in this study. First, we used a high cutoff point (11 on the HADS) to ensure a definite depression diagnosis. This choice may have resulted in a low prevalence of depression in this study. However, this cutoff point has a high sensitivity, at 85.71% [22]. Even with the small numbers of patients with depression, a significant predictor for depression was still found, indicating a true predictor. Second, the results of this study may not apply to other study populations, as the study setting was a tertiary care hospital. Finally, certain comorbid diseases or treatments were not considered, such as obstructive sleep apnea [29–32].

Conclusion

In conclusion, the prevalence of depression in patients with COPD in a tertiary care outpatient setting was low, at 4%. This study's comprehensive assessment identified severity of COPD as the only factor associated with depression in patients with COPD. Further studies are required to confirm the results of this study.

References

1. Balbirsingh V, Mohammed AS, Turner AM, Newnham M. Cardiovascular disease in chronic obstructive pulmonary disease: a narrative review. Thorax 2022;thoraxjnl -2021-218333.
2. Zareifopoulos N, Bellou A, Spiropoulou A, Spiropoulos K. Prevalence, Contribution to Disease Burden and Management of Comorbid Depression and Anxiety in Chronic Obstructive Pulmonary Disease: A Narrative Review. COPD 2019;16:406–17.
3. Alhajery MA. The Overlap Syndrome: A Combination of Chronic Obstructive Pulmonary Disease and Obstructive Sleep Apnea. Cureus 2024;16:e52349.
4. Khamsai S, Mahawarakorn P, Limpawattana P, Chindaprasirt J, Sukeepaisarnjaroen W, Silaruks S, et al. Prevalence and factors correlated with hypertension secondary from obstructive sleep apnea. Multidiscip Respir Med 2021;16:777.
5. Khamsai S, Chootrakool A, Limpawattana P, Chindaprasirt J, Sukeepaisarnjaroen W, Chotmongkol V, et al. Hypertensive crisis in patients with obstructive sleep apnea-induced hypertension. BMC Cardiovasc Disord 2021;21:310.
6. Blakemore A, Dickens C, Guthrie E, Bower P, Kontopantelis E, Afzal C, et al. Depression and anxiety predict health-related quality of life in chronic obstructive pulmonary disease: systematic review and meta-analysis. Int J Chron Obstruct Pulmon Dis 2014;9:501–12.
7. Cully JA, Graham DP, Stanley MA, Ferguson CJ, Sharafkhaneh A, Souchek J, et al. Quality of life in patients with chronic obstructive pulmonary disease and comorbid anxiety or depression. Psychosomatics 2006;47:312–9.
8. Mehta JR, Ratnani IJ, Dave JD, Panchal BN, Patel AK, Vala AU. Association of psychiatric co-morbidities and quality of life with severity of chronic obstructive pulmonary disease. East Asian Arch Psychiatry 2014; 24:148–55.
9. Almagro P, Soler-Cataluña JJ, Huerta A, González-Segura D, Cosío BG, CLAVE Study Investigators. Impact of comorbidities in COPD clinical control criteria. The CLAVE study. BMC Pulm Med 2024;24:6.
10. Panagioti M, Scott C, Blakemore A, Coventry PA. Overview of the prevalence, impact, and management of depression and anxiety in chronic obstructive pulmonary disease. Int J Chron Obstruct Pulmon Dis 2014;9:1289–306.

11. Zareifopoulos N, Bellou A, Spiropoulou A, Spiropoulos K. Prevalence, Contribution to Disease Burden and Management of Comorbid Depression and Anxiety in Chronic Obstructive Pulmonary Disease: A Narrative Review. COPD 2019;16:406–17.
12. Willgoss TG, Yohannes AM. Anxiety disorders in patients with COPD: a systematic review. Respir Care 2013;58:858–66.
13. Rahi MS, Thilagar B, Balaji S, Prabhakaran SY, Mudgal M, Rajoo S, et al. The Impact of Anxiety and Depression in Chronic Obstructive Pulmonary Disease. Adv Respir Med 2023;91:123–34.
14. Tsai T-Y, Livneh H, Lu M-C, Tsai P-Y, Chen P-C, Sung F-C. Increased risk and related factors of depression among patients with COPD: a population-based cohort study. BMC Public Health 2013;13:976.
15. Kayhan F, Ilik F, Karamanli H, Cemal Pazarli A, Kayhan A. Major Depression in Long-Term Oxygen Therapy Dependent Chronic Obstructive Pulmonary Disease. Perspect Psychiatr Care 2018;54:6–10.
16. Lee J-H, Park MA, Park MJ, Jo YS. Clinical characteristics and related risk factors of depression in patients with early COPD. Int J Chron Obstruct Pulmon Dis 2018;13:1583–90.
17. Silva Júnior JLR, Conde MB, de Sousa Corrêa K, da Silva C, da Silva Prestes L, Rabahi MF. COPD Assessment Test (CAT) score as a predictor of major depression among subjects with chronic obstructive pulmonary disease and mild hypoxemia: a case-control study. BMC Pulm Med 2014;14:186.
18. Matte DL, Pizzichini MMM, Hoepers ATC, Diaz AP, Karloh M, Dias M, et al. Prevalence of depression in COPD: A systematic review and meta-analysis of controlled studies. Respir Med 2016;117:154–61.
19. Ahmed RE, Bdair IA, Al-Mugheed K, Alshahrani SH, Alalyani MM, Ramaiah R, et al. Empowering Self-Efficacy by Using Patient Empowerment among Chronic Obstructive Pulmonary Disease: Pre-Post-Test Study. Healthcare (Basel) 2023;11:430.
20. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361–70.
21. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361–70.
22. Nilchaikovit T, Lotrakul M, Phisansuthideth U. Development of Thai version of hospital anxiety and depression scale in cancer patients. J Psychiatr Assoc Thai 1996;41:18–30.
23. Bock K, Bendstrup E, Hilberg O, Løkke A. Screening tools for evaluation of depression in Chronic Obstructive Pulmonary Disease (COPD). A systematic review. Eur Clin Respir J 2017;4:1332931.
24. Khikmah KN, Indahwati I, Fitrianto A, Erfiani E, Amelia R. Backwards Stepwise Binary Logistic Regression for Determination Population Growth Rate Factor in Java Island. Jambura J Math 2022;4:177–87.
25. Brennan C, Worrall-Davies A, McMillan D, Gilbody S, House A. The Hospital Anxiety and Depression Scale: a diagnostic meta-analysis of case-finding ability. J Psychosom Res 2010;69:371–8.
26. Huang K, Huang K, Xu J, Yang L, Zhao J, Zhang X, et al. Anxiety and Depression in Patients with Chronic Obstructive Pulmonary Disease in China: Results from the China Pulmonary Health [CPH] Study. Int J Chron Obstruct Pulmon Dis 2021;16:3387–96.
27. Di Marco F, Verga M, Reggente M, Maria Casanova F, Santus P, Blasi F, et al. Anxiety and depression in COPD patients: The roles of gender and disease severity. Respir Med 2006;100:1767–74.
28. Wong T-S, Xiang Y-T, Tsoh J, Ungvari GS, Ko FWS, Hui DSC, et al. Depressive disorders in older patients with chronic obstructive pulmonary disease (COPD) in Hong Kong: a controlled study. Aging Ment Health 2014;18:588–92.
29. Tongdee S, Sawunyavisuth B, Sukeepaisarnjaroen W, Boonsawat W, Khamsai S, Sawanyawisuth K. Clinical factors predictive of appropriate treatment in COPD: a community hospital setting. Drug Target Insights 2021;15:21–5.
30. Soontornrungsun B, Khamsai S, Sawunyavisuth B, Limpawattana P, Chindaprasirt J, Senthong V, et al. Obstructive sleep apnea in patients with diabetes less than 40 years of age. Diabetes Metab Syndr 2020;14:1859–63.
31. Khamsai S, Mahawarakorn P, Limpawattana P, Chindaprasirt J, Sukeepaisarnjaroen W, Silaruks S, et al. Prevalence and factors correlated with hypertension secondary from obstructive sleep apnea. Multidiscip Respir Med 2021;16:777.
32. Jeerasuwannakul B, Sawunyavisuth B, Khamsai S, Sawanyawisuth K. Prevalence and risk factors of proteinuria in patients with type 2 diabetes mellitus. Asia-Pacific Journal of Science and Technology 2021;26: APST-26-04-02.

Received for publication: 20 December 2023 - Accepted for publication: 13 March 2024

Licensee Mattioli 1885, Italy
Multidisciplinary Respiratory Medicine 2024; 19: 951
doi: 10.5826/mrm.2024.951