Health-Related Quality of Life of the Patients with Chronic Obstructive Pulmonary Disease in Relation to Negative Psychological Emotional States: A Cross-Sectional Study

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is a long-term narrowing of the airways caused by emphysema or chronic bronchitis. In addition to physical symptoms, it affects psychological and social functioning.

Aim: This study aims to examine the correlation between specific aspects of the perceived health-related quality of life and the presence of negative emotional states - depression, anxiety and stress in individuals with COPD.

Methods: We conducted an observational cross-sectional study in 2023 on a convenience sample of patients with COPD who were treated at the Pulmonology Clinic of the General Hospital "Dr. Ivo Pedišić" in Sisak, Croatia. We collected data with a questionnaire that included questions on personal characteristics, general health status, and COPD burden, along with two standardized instruments: the Depression, Anxiety and Stress Scale (DASS) and the St. George's Respiratory Questionnaire (SGRQ-S). Statistical analysis included descriptive statistics and parametric tests, specifically Pearson's correlation coefficient.

Results: A total of 128 participants were included in the study. Limitations in health-related quality of life were significantly correlated with the level of stress (r=0.80; p<0.01), anxiety (r=0.83; p<0.01) and depression (r=0.80; p<0.01). Reduced quality of life was associated with participants' age (r=0.49, p<0.01) and the duration of the disease (r=0.48, p<0.01). Low to moderate coefficients of Person correlation (0.35 to 0.41) point to a significant correlation between age, duration of the disease, and the appearance of negative emotional states.

Conclusion: The reduced health-related quality of life and the occurrence of negative emotional states in patients with COPD represent a significant problem in the patient's life, especially in those with advanced disease. In the treatment of patients with COPD, in addition to assessing the physical condition, attention should also be paid to the psychosocial assessment. An interdisciplinary approach should be included in the assessment and treatment of people with COPD, to provide better quality of healthcare services.

Keywords: chronic obstructive pulmonary disease, healthrelated quality of life, stress, anxiety, depression



Introduction

Chronic obstructive pulmonary disease (COPD) is a partially reversible disease of the lung parenchyma, characterised by reduced airflow through the airways. It develops as a result of persistent inflammation caused by harmful particles, gases, and vapours. COPD is a progressive disease, with numerous symptoms e.g. difficulty breathing, persistent cough, mucus production, and fatigue (1-3). The number of people suffering from and dying from COPD is constantly increasing worldwide. The cause of high mortality is not the disease itself, but the existence of numerous comorbidities, such as cardiovascular diseases that are associated with oxidative stress of cells (4). Despite the availability of treatment, people living with COPD face multiple challenges. In addition to physical difficulties, they often face emotional, economic, and social problems (5). The physical aspects of COPD include difficulty breathing, reduced physical performance (physical weakening), and increased susceptibility to infections (6, 7). The occurrence of physical symptoms affects the subjective feelings and experiences of the patient, and the intensification of symptoms can lead to feelings of worthlessness, helplessness and loss of control due to a decrease in the patient's quality of daily life. Such a state can be a precursor to the development of anxiety and depression. Patients with COPD often face emotional distress due to limitations in physical activity, fear of worsening symptoms, and challenges in daily activities (8). Anxiety is noticeably more pronounced in patients with COPD. Patients may experience anxiety due to difficulty breathing, fear of choking attacks, or due to limitations in usual activities (9). Anxiety is a condition that is defined by changes in behaviour, feelings of panic, worry, fear and depression, and most often occurs due to a loss of security and control that the individual does not know or cannot cope with (10). In addition to the fact that the occurrence of anxiety disrupts the psychological state of an individual, it also greatly affects the physical state, health, and success of treatment of the disease itself.

The psychological status of patients is rarely examined, and the main focus is placed on physical symptoms (8). In patients with developed negative psychological emotions and anxiety, this adaptation is more difficult, and they increasingly focus on resolving and reducing the physical symptoms of the disease itself, since they are not successful in this despite pharmacological therapy, psychological symptoms worsen, and patients find it increasingly difficult to cope with the disease itself (11). Depression also poses a significant challenge for healthcare professionals working with patients, as well as for the patients themselves. Patients with COPD have an increased risk of depressive disorders, which further complicates the process of treatment and adaptation to the disease. Depression can affect adherence to therapy, reduce motivation to change lifestyle habits, and worsen the general condition of the patient (8).

Quality of life encompasses various areas of an individual's life. It refers to the socioeconomic status, physical and mental health, beliefs and attitudes, social support and living conditions of an individual. It is closely related to physical health because illnesses and the limitations that arise due to illnesses affect the overall experience of life and possibilities (5). Previous research has shown that patients who actively engage in physical and occupational therapy experience greater improvements in physical and mental health, such as improved cardiovascular function and reduced levels of depressive symptoms and anxiety (12). Overall psychosocial support for patients is also important due to the possibility of progression of symptoms of the disease itself and the need for increasing adaptation (13). Older patients have a harder time coping with psychological and physical changes and are therefore at greater risk of developing negative emotions and anxiety compared to younger patients (14). Previous research also indicates that female subjects have a lower quality of life and higher levels of anxiety and depression compared to male subjects (15).

Since there is no previous research about this topic in Croatia, it is believed that the results

could help raise awareness of the need to provide better and more comprehensive care for patients with COPD, which will include both health, social and psychological needs of the person.

The aim of this study is to examine differences in the severity of negative emotional states: depression, anxiety and stress and healthrelated quality of life, with regard to some personal characteristics of individuals with COPD.

Methods

Study design

This was a cross-sectional study.

Ethics

This research was conducted in accordance with the usual standards for ethical research, such as informing participants about the purpose of the research, the voluntary nature of participation, anonymity and confidentiality, and other. The study protocol was approved by the Ethics Committee of the General Hospital "Dr. Ivo Pedišić" Sisak, Croatia (decision dated February 27, 2023; Classification number: 2176-125-04-1278-5/23).

Participants

The research was conducted with 128 conveniently selected patients with COPD, who were treated at the Pulmonology clinic of the General Hospital "Dr. Ivo Pedišić" in Sisak. No specific inclusion or exclusion criteria were applied in the selection of participants.

Data collection and study tool

Data were collected from February to May 2023 in outpatient clinic admission of the Pulmonology clinic of the General Hospital "Dr. Ivo Pedišić" in Sisak, Croatia. Participants completed the questionnaire individually or through a structured interview with health workers if assistance was needed. The questionnaire included questions about personal characteristics, characteristics of general health status and burden with COPD. The questionnaire also contained two additional measurement instruments. The Depression, Anxiety and Stress Scale (DASS) (16, 17) and the St. George's Respiratory Questionnaire (SGRQ-S) (18). SGRQ-S was translated using the double translation method and adapted to the needs of the research. It consists of several units and indicators of the healthrelated quality of life. The total result refers to the level of limitations in healthrelated quality of life (difficulties), and it is achieved in the differentially weighted and summed responses on all items together. The questionnaire consists of three subscales, namely the severity of symptoms, the severity of limitations in performing activities and the severity of the impact of the disease on quality of life (symptom, activity and impact). The short version of DASS-21 is used to assess the severity of symptoms of stress, anxiety and depression. The total scores obtained on the subscales were multiplied by a factor of 2 (16). The DAS scale was translated and compared with previous translations. Both measurement instruments are freely available for use.

Statistical analysis

The research data were analysed using the SPSS statistical software package, version 24. Descriptive statistics were calculated, including frequencies, measures of central tendency, and dispersion. Pearson's correlation coefficient was used to assess the linear relationship between continuous variables, while t-tests were applied to evaluate mean differences between independent groups, consistent with the nature of our variables and research hypotheses. Cohen's d for t-tests and correlation coefficients for effect magnitude were calculated to facilitate the interpretation of the practical significance of the effect size measures. Before applying tests, the assumptions for the use of parametric statistical tests were verified. All p-values were two-sided, with the level of significance set at $\alpha = 0.05$.

Sample size

This was a cross-sectional survey conducted on a convenience sample of patients attending an outpatient clinic. The primary objective was to explore participants' opinions and attitudes, as well as to examine differences in responses based on sociodemographic characteristics. As this was not an interventional or hypothesis-driven study designed to test specific treatment effects, a formal sample size calculation was not performed. Rather, we aimed to recruit as many participants as feasibly possible during the study period to provide a broad descriptive overview.

Results

The study included 128 participants, of whom 62 were male and 66 were female. The average age of the study participants was 62 years (C= 62; M= 59.99; sd=14.99; MIN=27; MAX=89). The majority of participants had completed secondary and high school education (38%) (The precise proportions are shown in Table 1).

Most participants have been living with COPD for 6 and 10 years (29%), rated their health as average (45%), and reported a moderate burden of COPD symptoms (50%). About 30% of them state that they experience significant or severe difficulties due to the disease. As many as 62% of participants reported having additional chronic illnesses for which they receive prescribed treatment, and approximately 59% reported taking

medication for psychological disorders (Table 2).

According to norms (10), participants in this study, on average, experience severe anxiety (C=20; M=20.14 \pm 12.89), moderate stress (C=20; M=19.75 \pm 13.44) and moderate depression (C=16; M=17.20 \pm 13.59). The distribution of the results points to a significant difference from the normal distribution (Kolmogorov Smirnov test for individual scales ranges from 0.11 to 0.13; p<0.01). Cronbach alpha internal consistency coefficients indicate high to very high reliability of the measuring instrument (0.90 to 0.94).

On average, most participants reported fewer limitations and difficulties that impair their quality of life because of COPD. The participants achieved the minimum and maximum results expected in the theoretical range, as shown in Table 3. That is, from 0% to 100% of limitations that reduce the quality of life due to the disease according to the SGRQ-S manual (19). An average result of 43% was achieved on the estimated limitation (C=1391.80) (Table 3). On average, the percentage of symptom severity achieved was 60%. The percentage of the severity of activity limitations due to COPD was 45%, and the impact of the disease on quality of life was 39%.

	f	0/0		
Sex				
Female	66	48		
Male	62	52		
Age (years)				
< 39	16	13		
40-64	58	45		
> 65	54	42		
Education level				
Incomplete elementary school	7	5.5		
Primary school	30	23		
High school	48	38		
College/university	23	18		
Master's degree/doctorate	8	6.3		

Table 1. Demographic data of the participants (N=128)

	f	0/0			
Duration of disease					
Less than 6 months	9	7			
7 months to 2 years	22	17			
3 years to 5 years	26	20			
6 years to 10 years	37	29			
More than 11 years	34	27			
Health self-assessment					
Very bad	10	7.8			
Bad	30	23			
Average	58	45			
Good	26	20			
Very good	4	3.1			
Self-assessed difficulties living with COPD					
not at all	3	2.3			
somewhat	22	17			
moderately	64	50			
quite	19	15			
very	20	16			
Additional chronic disease (in therapy)					
Yes	79	62			
No	32	25			
I don't know	17	13			
Taking medication for mental disorders					
Never or almost never	15	12			
Sometimes	20	16			
Often	17	13			
Uses prescribed therapy as needed	30	23			
Uses prescribed therapy (daily)	46	36			

Table 2. Distribution of respondents according to characteristics of living with COPD

Table 3. Distribution of respondents according to characteristics of living with COPD

	Μ	sd	С	min	max
Difficulties _a	1458.62	1001.22	1391.80	0.00	3201.90
Symptom _b	332.19	144.57	341.00	0.00	566.20
Activity _c	440.34	362.64	441.00	0.00	566.20
Impact _d	686.08	545.58	640.75	0.00	1652.80

Note: a. SGRQ total level of limitations in health-related quality of life; b. the severity of symptoms; c. the severity of limitations in performing activities; d. the impact of the disease on quality of life Participants who report a higher level of limitations in health-related quality of life also report a higher level of stress (r=0.80; p<0.01), a higher level of anxiety (r=0.83; p<0.01) and a higher level of depression (r=0.80; p<0.01). The indicated Pearson correlation coefficients, as well as other intercorrelations between variables, are shown in Table 4.

Males and females equally report limitations in health-related quality of life and emotional states, which is confirmed by the statistically insignificant t-tests shown in Table 5. Only one significant difference was found. Compared to female participants (304.0 ± 142.6), male participants (362.2 ± 141.7) experienced significantly higher symptom severity, but with a small effect size (t=2.31; p<0.05; Cohen's d=0.41).

Since participants' age and the duration of the disease were moderately positively correlated (r=0.61; p<0.01), a partial correlation analysis was carried out. Results have shown a significant association between the age of the participants and the duration of the disease with health-related quality of life and negative emotional states.

Table 4. *Pearson correlation coefficients between the total level of limitations in health-related quality of life (difficulties, symptom, activity and impact) and negative emotional states (stress, anxiety and depression)*

	Difficulties	Symptom	Activity	Impact
Stress	0.80**	0.67**	0.70**	0.83**
Anxiety	0.83**	0.71**	0.73**	0.85**
Depression	0.80**	0.65**	0.70**	0.83**

Note: **p<0.01

	Ν	Μ	sd	t+	р
Difficulties					
Male	62	1531.08	1004.17	0.8	0.4
Female	66	1390.56	1001.30	0.8	
Symptom					
Male	62	362.18	141.67	2.2	0.02*
Female	66	304.02	142.60	2.3	
Activity					
Male	62	458.22	358.43	0.5	0.6
Female	66	423.55	368.51		
Impact					
Male	62	710.67	557.48	0.5	0.6
Female	66	662.99	537.40		
Stress					
Male	62	9.87	7.07	0.01	1.0
Female	66	9.88	6.42	-0.01	
Anxiety					
Male	62	10.42	6.84	0.6	0.6
Female	66	9.74	6.08		
Depression					
Male	62	8.74	6.96	0.2	0.9
Female	66	8.47	6.69	0.2	0.0

Table 5. Distribution of respondents according to characteristics of living with COPD

Note: *p<0.05; +df=126

Older participants show a significantly higher level of limitations in health-related quality of life (r=0.28; p<0.01), higher severity of limitations in performing activities (r=0.32; p<0.01) and higher impact of the disease on quality of life (r=0.27; p<0.01), as indicated by the statistically significant Pearson correlation coefficients shown in Table 6. They also express higher levels of anxiety and depression, which are independent of the duration of COPD (controlled variable)

(r=0.22; p<0.05). On the other hand, the duration of the disease, independent of the age of participants, is significantly associated with the perceived severity of symptoms (r=0.32; p<0.01) and stress (r=0.21; p<0.05) but not with the severity of limitations in performing activities, or depression. The remaining values of the correlation coefficients are similar to the association of age with the tested correlates (Table 6).

Table 6. Pearson correlation coefficients between the total level of limitations in health-related quality of life (difficulties, symptom, activity and impact) and negative emotional states (stress, anxiety and depression) and characteristics of patient age and disease duration

	Age _a	Disease duration _b
Difficulties	0.28**	0.27**
Symptom	0.10	0.32**
Activity	0.32**	0.17
Impact	0.27**	0.28**
Stress	0.17	0.21*
Anxiety	0.22*	0.23**
Depression	0.22*	0.17

Note: **p<0.01; *p<0.05; a. control for disease duration; b. control for age

Discussion

The results of this study showed that there is a significant relationship between certain aspects of the perceived health-related quality of life and the expression of negative emotional states: depression, anxiety and stress in people with COPD. The overall estimated limitations in health-related quality of life, as well as its individual components (symptom, activity and impact) were positively related to the expression of negative emotional states (depression, anxiety and stress).

The results of this research are consistent with previous findings. Eisner's research showed an extremely high risk of a decrease in the quality of life of patients who experience depressive, anxious or stressful changes due to the symptomatology of the underlying disease (19). A study by Murphy, Lau, and Agius found that age was associated with lower quality of life and higher levels of depression, anxiety, and stress (20). A study conducted by Schneider and colleagues on 35,000 subjects with COPD over a 10year period, showed that people with severe COPD are twice as likely to develop depression compared to people with mild COPD (21).

In terms of the differences investigated among participants, a significant association was found between the age of participants and the duration of disease with the overall assessment of limitations in health-related quality of life and anxiety as an emotional state. Different significant associations were found when individual components were observed. Older age was associated with the severity of activity limitations and estimated higher level of depression. Duration of illness, unlike participants' age, was significantly associated with the level of symptom burden and expressed anxiety. Contrary to the assumed hypotheses and findings from previous research (15, 22), only a significant difference in the burden of COPD symptoms was found according to the gender of the participants. Male participants reported more limitations in this aspect of health-related quality of life.

Although previous research indicated that female subjects have a lower quality of life and higher levels of anxiety and depression compared to male subjects (15), some other studies did not support that conclusion. A study conducted by Turan et al. to determine the impact of anxiety and depression on the treatment of patients with COPD showed that the anxiety sensitivity index increased at each check-up (10). Results have shown a higher level of anxiety and a higher level of depression, but no significant differences were found in relation to age, gender, level of education and the presence of comorbidities. More recent research suggests that gender differences may influence the development and progress in the treatment of diseases (23). Regarding the association between negative emotional states and the occurrence of symptoms of depression, anxiety and stress, the Matera study did not show a statistically significant difference with respect to the gender of the subjects (23, 24).

Schneider's data confirmed the association between reduced quality of life and higher levels of anxiety, depression, and stress with age. Younger subjects had higher quality of life and lower levels of anxiety, stress, and depression than older subjects (21). Older subjects had significantly more difficulty tolerating the physical symptoms of COPD and the association of symptoms with negative emotional states (25). A study by Eisner et al. found that subjects with COPD were 85% more likely to develop symptoms of anxiety disorders than matched healthy control subjects (19). Eisner's study included controlled variables based on demographic characteristics and disease stage. The data obtained showed a higher number of anxiety states in patients with longer and more severe disease (19). That was also shown in this study since a significant association was found between the duration of the disease

and negative emotional states of stress, depression and anxiety.

The results from previous studies show a lower health-related quality of life and higher levels of depression, anxiety and stress in patients who have been treated for a longer period. In a study conducted by Maurer et al., the results showed that the prevalence of depression is higher in patients who have recently recovered from an acute exacerbation, which significantly affects the reduction of quality of life. The study focused on respondents with a more severe degree of illness in whom the prevalence of depression ranged from 37 to 71% and the prevalence of anxiety from 50 to 75%, which is higher than the prevalence rates in other advanced diseases such as cancer, AIDS, heart disease, and kidney disease (11). The results of Stage's study showed an association between the duration of illness and the occurrence of a lower quality of life and negative emotional states (26).

This study has several limitations that should be acknowledged. First, the sample was based on a convenience sample of patients attending a single outpatient clinic, which may limit the generalisability of the findings to broader populations. Additionally, no formal sample size calculation was conducted prior to data collection. As this was an exploratory, cross-sectional study without predefined hypotheses, we aimed to include as many participants as practically possible during the study period. Furthermore, data were collected by medical staff working in the outpatient clinic, which may have influenced participants' responses due to researcher reactivity. It is also possible that certain unmeasured factors specific to the place of residence or individual characteristicssuch as poverty, and personal experiences contributing to severe emotional distress (e.g., PTSD in war veterans, or trauma and loss due to the 2020 earthquake in Sisak) may have influenced both the emotional state and health-related quality of life of the participants as confounding variables.

Conclusion

The results of this study suggest that there is a significant correlation between health-related quality of life and psychological emotional states, as an indicator of mental health in patients with COPD. This relationship becomes more significant with the increasing age of the patients and the duration of the disease. COPD is a chronic incurable disease whose prevalence in the world is continuously increasing. With the increase in the number of patients and the extension of life expectancy, there is an increasing need to involve numerous experts from different professions (e.g. psychologists, social workers, clerics) in order to provide patients with a longer and higher quality of life. To improve the quality of healthcare services, in line with the theoretical assumptions of the biopsychosocial model of health, it is necessary to incorporate an interdisciplinary approach in planning medical care and treatment for patients with COPD.

Declarations

Aknowledgements: This study was part of Lucija Caren's Master of Nursing thesis, which was originally written and defended in Croatian. The thesis is available in the online repository: https://urn.nsk.hr/urn:nbn:hr:224:171597

Authors' contributions: LC and LS contributed to the study design; LC was responsible for data collection; LC and LS conducted the data analysis; LC, MČ, and LS participated in the interpretation of the data; LC wrote the first draft of the manuscript; LC, MČ, and LS revised the manuscript critically for important intellectual content. All authors approved the final version of the manuscript.

Ethics considerations: The study protocol was approved by the Ethics Committee of the General Hospital "Dr. Ivo Pedišić" Sisak, Croatia (decision dated February 27, 2023; Classification number: 2176-125-04-1278-5/23). Participation was voluntary and anonymous. Participants did not receive any compensation for taking part in the study. All methods were carried out in accordance with relevant guidelines and regulations.

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References

- 1. Ivančević Ž. MSD priručnik dijagnostike i terapije. Split: Placebo; 2010.
- Matanić D, Flego V. Kronična opstruktivna plućna bolest – multisistemska bolest. *Medicina*. 2009;40(1):60-64.
- 3. Škrinjarić-Cincar S, Basioli Kasap E. Prepoznajemo li bolesnika s KOPB-om i astmom na vrijeme?. *Medicus*. 2021;30(2):145-148.
- Gemišević M, Mesarić M. Kronična opstruktivna plućna bolest: patofiziologija i fizioterapijski pristup. *Zbornik sveučilišta Libertas.* 2022;7(7): 91-104.
- Grigsby M, Siddharthan T, Chowdhury AM, Siddiquee A, Rubinstein A, Sobrino E et al. Socioeconomic status and COPD among low and middle-income countries. *Int J Chron Obstruct Pulmon Dis.* 2016;5(11):2497-2507.
- 6. Karamarković Lazarušić N. Tjelesna aktivnost i KOPB. *Medicus*. 2019;28(2):237-245.
- Jalušić Glunčić T. Važnost razumijevanja parametra plućne funkcije kod bolesnika s kroničnom opstruktivnom plućnom bolesti. *Medicina*. 2012;48(2):179-185.
- 8. Yohannes AM, Alexopoulus GS. Depression and anxiety in patients with COPD. *European Respiratory Review*. 2014;23(133):345–349.
- Gregurek R, Ražić Pavičić A. Anksioznost: psihodinamski i neurobiološki dijalog. Socijalna psihijatrija. 2017;45(2):117-124.
- 10. Turan O, Yemez B, Itil O. The effects of anxiety and depression symptoms on treatment adherence in COPD patients. *Prim Health Care Res Dev.* 2014;15(3):244-251.
- 11. Maurer J, Rebbapragada V, Borson S, Goldstein R, Kunik E M, Yohhanes M A et al. Anxiety and depression in COPD: current understanding, unanswered questions, and research needs. *Chest.* 2008;134(4):43S-56S.
- 12. Flego V. Kompletna skrb o bolesniku s astmom ili KOPB-om od edukacije i plana liječenja do plućne rehabilitacije. *Medicus*. 2021;30(2):227-232.
- 13. Turnier L, Eakin M, Woo H, Dransfield M, Parekh T, Krishnan AJ et al. The influence of social support on COPD outcomes mediated by depression. *PLoS One*. 2021;16(3).

- 14. Štefanac S, Grabovac I. Radna terapija osoba oboljelih od kronične opstruktivne plućne bolesti. *Medicus*. 2013;22(2):125-131.
- 15. Di Marco F, Verga M, Reggente M, Casanova FM, Santus P, Blasi F et al. Anxiety and depression in COPD patients: The roles of gender and disease severity. *Respir Med.* 2006;100(10):1767-74.
- 16. Lovibond SH, Lovibond PF. The Depression Anxiety Stress Scales. Sydney: Psychology Foundation; 1995.
- 17. Ivaković F. Skale depresije, anksioznosti i stresa DASS-S i DASS-O Priručnik. Zagreb; 2019.
- Jones PW, Quirk FH, Baveystock CM. The St George's Respiratory Questionnaire. *Respir Med.* 1991;85(2):25-31.
- 19. Eisner MD, Blanc PD, Yelin EH, Katz PP, Sanches G, Irribaren C et al. Influence of anxiety on health outcomes in COPD. *Thorax*. 2010;65:229–234.
- 20. Murphy J, Lau G, Agius M. An audit of the reporting of depression & anxiety in COPD patients. *Psychiatr Danub*. 2019;31(3):276-281.

- 21. Schneider C, Jick S, Bothner U, Meier CR. COPD and the risk of depression. *Chest.* 2010;137(2): 341-7.
- 22. Camp PG, O'Donnell DE, Postma DS. Chronic obstructive pulmonary disease in men and women: myths and reality. *Proc Am Thorac Soc.* 2009;6(6):535-8.
- 23. Kahnert K, Jörres RA, Behr J, Welte T. The Diagnosis and Treatment of COPD and Its Comorbidities. *Dtsch Arztebl Int.* 2023;120(25):434-444.
- 24. Matera MG, Ora J, Calzetta L, Rogliani P, Cazzola M. Sex differences in COPD management. *Expert Rev Clin Pharmacol.* 2021;14(3):323-332.
- Bennett D, Bowen B, McCarthy P, Subramaniam A, O'Connor M, Henry M. Outcomes of Pulmonary Rehabilitation for COPD in Older Patients: A Comparative Study. COPD. 2017;14(2):170-175.
- Stage KB, Middelboe T, Stage TB, Sørensen CH. Depression in COPD--management and quality of life considerations. *Int J Chron Obstruct Pulmon Dis*. 2006;1(3):315-20.