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## Quality of life parameters of patients with combined pathology of asthma and COPD on baseline therapy

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#### Abstract

The current prevalence of obstructive lung diseases (COPD and asthma) remains high in Ukraine and in the world. These diseases alone and in combination are a significant medical and social problem of humanity. The aim of our study was to evaluate the quality of life of patients with combined pathology of asthma and COPD, as well as compare it with such of patients with asthma and COPD.

In patients with asthma, COPD and their combination significant violations of all components of quality of life were revealed (according to the SGRQ). Activity limitation was more pronounced in COPD and asthma +COPD compared with asthma. In patients with combined pathology, quality of life worsens with an increase in the degree of bronchial obstruction and with increased respiratory resistance. The considerable smoking history (more than 10 pack-years) also affects all components of the quality of life.

**Keywords:** combined pathology of asthma and COPD, quality of life, St. George's Respiratory Questionnaire (SGRQ).

#### 1. Introduction

The current prevalence of obstructive lung diseases (COPD and asthma) remains high in Ukraine and in the world. These diseases alone and in combination are a significant medical and social problem of humanity. In recent years, the issue of combining these two diseases - the so-called asthma - COPD overlap (ACO) is widely discussed in the international medical community. Diagnosis of ACO is established in patients, which simultaneously have clinical features of both pathological conditions [1-4]. According to previous studies, the prevalence of ACO is quite significant, and ranges from 15 to 45% of patients with obstructive lung diseases, and also increases with age [5, 6].

The chronic course of these diseases, the limitation of functional capabilities, the need for a permanent pharmacotherapy leads to a modification of the lifestyle of the patient and their relatives, worsens the patients quality of life (QOL) [7, 8]. QOL, related to health, is considered as an integral characteristic of the physical, mental and social functioning of a healthy persons and patients, due to their subjective perceptions.

**The aim** of our study was to investigate the quality of life of patients with ACO, as well as compare it with such of patients with asthma and COPD.

**Patients.** The study included patients with signs of a combined pathology of asthma + COPD, over the age of 30 years. The diagnosis of asthma and COPD was established according to the GINA and GOLD criteria [9, 10]. The condition of patients was stable, there were no exacerbations 2 months before the study beginning.

The diagnosis of ACO was confirmed by the results of the lung function test - all patients had a fixed impaired bronchial patency - forced expiratory volume in 1 second / forced vital capacity (FEV1 / FVC) <70% after bronchodilator (commonly accepted COPD marker), and bronchial obstruction reversibility - an increase in FEV1 of  $\geq 12\%$  and  $\geq 200$  ml after the use of bronchodilator (400 mcg of salbutamol), usually more commonly associated with asthma.

Also patients with asthma and COPD without signs of a combination were included.

Patients were on baseline asthma and COPD therapy according to the severity of the disease, all taking short-acting beta2 agonists (SABA) as needed, and drugs for disease control (inhaled corticosteroids (ICS), a combination of ICS/ long-acting beta agonists (LABA), Tiotropium bromide, or triple therapy - ICS/LABA/ Tiotropium bromid).

Characteristics of patients are given in Table 1.

**Table 1:** Characteristics of patients.

Parameters	Asthma (n=34)	COPD (n =17)	ACO (n =140)
Sex, (n)	27 women, 7 men	7 women, 10 men	74 women, 66 men
Age, years	50,76±1,5	67,36±2,27	58,56±0,81
Body mass index, kg / m <sup>2</sup>	31,64±1,39	30,02±1,46	28,82±0,43
Smoking history, pack / years	2,87±1,28	8,06±3,28	10,35±1,77
Ex-smokers, (%)	12	18	7
Smokers, (%)	20	29	34
Never smokers (%)	68	53	59
Degree of asthma severity			
mild, (%)	32		6
moderate, (%)	59		79
severe, (%)	9		15
COPD groups (GOLD)			
A (%)		18	13
B (%)		11	21
C (%)		18	20
D (%)		53	46
Grade of severity (GOLD)			
1, (%)		29	29
2, (%)		29	58
3, (%)		36	11
4, (%)		6	2
Therapy prior to inclusion in the study			
Short-acting beta2 agonists (SABA) as needed, (%)	100	100	100
Inhaled corticosteroids (ICS), (%)	15	12	6
ICS/long-acting beta agonists (LABA), (%)	85	88	89
Tiotropium bromide, (%)	0	12	3
ICS/LABA/ Tiotropium bromid, (%)	0	0	2

## Methods

To determine the presence and severity of bronchial obstruction, all patients underwent spirometry with an analysis of the flow-volume curve of forced exhalation, as well as impulse oscillometry (Master Screen Pneumo, 2007, manufactured by Cardinal Health, Germany).

The quality of life was evaluated using the St. George's Respiratory Questionnaire (SGRQ). The SGRQ questionnaire assesses the quality of life in patients with respiratory diseases. It consists of 76 questions, the answers to which reflect the patient's subjective assessment of respiratory disorders, physical activity and its limitations, psychosocial adaptation, the effect of health status on daily activities, emotional perception of the disease, relationships with relatives, need and attitudes before treatment and prognosis of the disease. As a valuation parameter, the questionnaire uses 4 generalized scales (domains): "Symptoms" - subjective assessment by the patient of the severity of clinical signs of COPD; "Activity" - subjective assessment by the patient of the degree of limitation of physical activity, caused by the disease; "Impact" is a subjective assessment by the patient of the severity of the psychological and social problems resulting from the disease, and "Total Score" - a general indicator of quality of life that characterizes the overall negative impact of COPD on the health status [11,12]. The evaluation of each indicator after the scoring is performed on a 100-point scale.

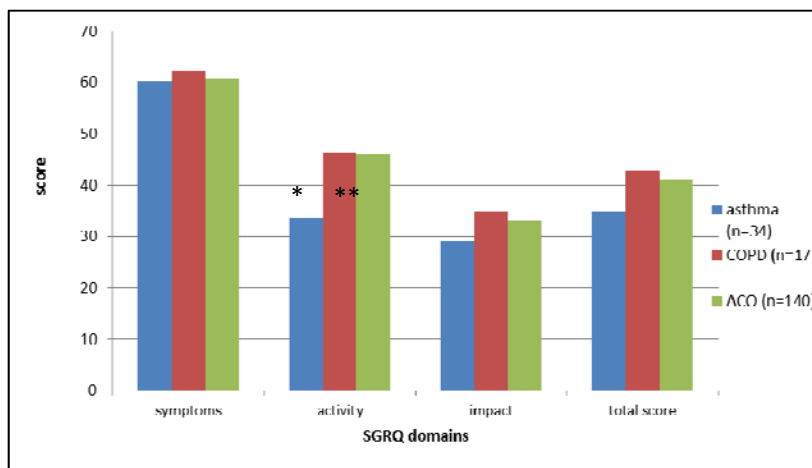
The higher the score, the more negative effect is caused by the illness on the patient's life. The high score of the questionnaire is associated with high mortality and the frequency of repeated hospitalizations, higher cost of medical care.

Statistical methods. Data accumulation and mathematical processing were carried out with the help of licensed software products included in the package Microsoft Office Professional 2007, the license Russian Academic OPEN No Level number 43437596. Statistical processing was performed using mathematical and statistical capabilities of MS Excel. The parameters were evaluated by means of the determination of the mean (M), the mean error (m), the reliability (t), the significance level (p), followed by the comparison using the *Student's t-test* and the *Mann-Whitney U test*, depending on the type of distribution of the received data.

## Results.

Previous studies have shown that the low score of the SGRQ (<25) is rarely found in patients with COPD, and the score ≥ 25 is rarely found in healthy individuals [13]. In our study, the score of all domains of the questionnaire in patients with asthma, COPD and ACO exceeded 25 points.

We compared the scores of all domains in patients with ACO, asthma and COPD (Fig. 1).



\*  $p < 0.05$ ; \*\*  $p < 0.01$  compared to asthma

**Fig 1:** Comparison of domains of the SGRQ depending on the main pathology.

Symptoms (severity of clinical signs of disease) strongly influenced the quality of life of patients, almost equally (the average score of this domain was within 60-62 points in all three groups).

To a large extent, the physical activity caused by the disease was also limited - COPD and combined pathology significantly reduced the activity of patients more than asthma ( $46,17 \pm 1,7$  - mean score in COPD,  $45,99 \pm 1,96$  - average score at ACO, and the average score in asthma -  $33,59 \pm 3,7$ ). There was no significant difference between the severity of the psychological and social problems as a result of the disease in the patients' groups, the mean score fluctuated within ( $29,09 \pm 3,17$ ) - in asthma, ( $34,85 \pm 4,27$ ) - in COPD, and ( $32,92 \pm 1,51$ ) - in ACO.

According to the general score of quality of life, the patients, depending on the disease, did not differ significantly, but the rates were somewhat higher also in the groups of patients with COPD and combined pathology.

We had a special interest in the evaluation of the quality of life in patients with combination of asthma and COPD,

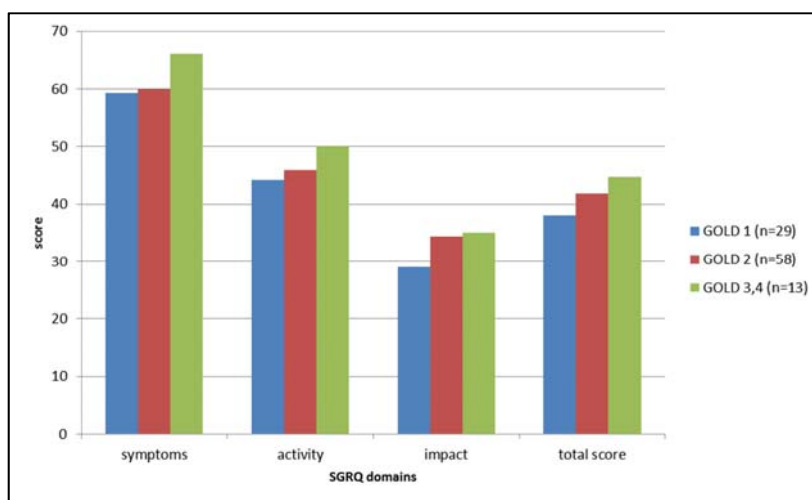
depending on the degree of airflow limitation and the level of respiratory resistance.

The distribution of patients according to the severity of bronchial obstruction was performed according to the GOLD spirometric classification (Table 2) [9].

**Table 2:** Classification of the severity of bronchial obstruction in COPD by the level of FEV1 after the administration of bronchodilator (GOLD, 2017).

Stage	FEV1, % predicted
GOLD 1 (mild)	FEV1 $\geq$ 80 %
GOLD 2 (moderate)	50 $\leq$ FEV1 < 80 %
GOLD 3 (severe)	30 $\leq$ FEV1 < 50 %
GOLD 4 (very severe)	FEV1 < 30 %

Since only 2 patients belonged to the GOLD 4 group, groups 3 and 4 were combined for data analysis. Indicators of QOL of patients, depending on the degree of bronchial obstruction, are shown in Fig. 2.



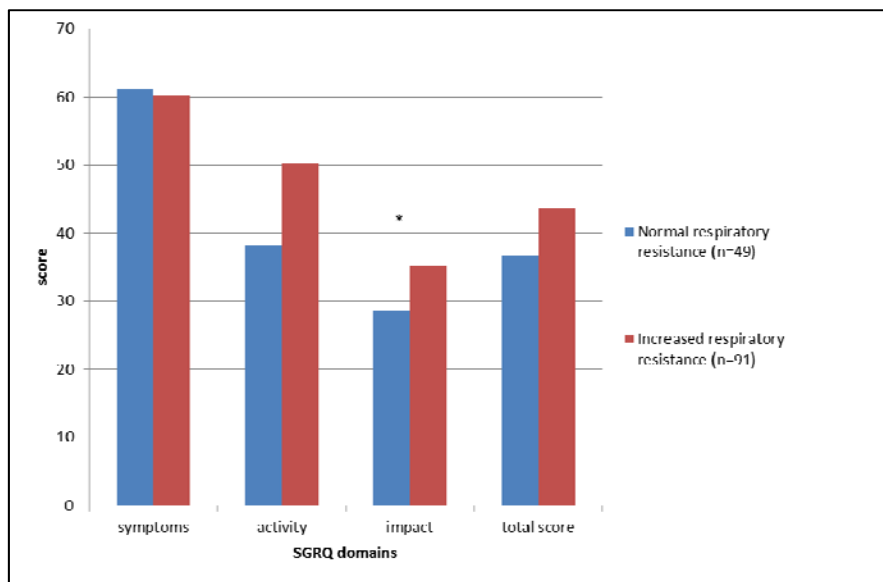
**Fig 2:** Domains of quality of life of patients with ACO, depending on the degree of bronchial obstruction (GOLD spirometric classification).

Lower quality of life indicators were determined for all domains with an increased degree of bronchial obstruction; however, these changes did not reach statistical significance. According to our previous studies, when interpreting

breathing mechanics according to impulse oscillometry data in patients with ACO, the level of respiratory resistance at a frequency of 5 Hz, which is equal to or exceeds 130% of the predicted values, is proposed to be regarded as a sign of

increased respiratory resistance. The patients were divided into groups depending on the

presence or absence of increased respiratory resistance. Indicators of quality of life of patients are given on Fig. 3



\*-p<0.05; \*\*p<0.01

Fig 3: Changes in the quality of life domains (SGRQ) depending on respiratory resistance in patients with ACO

The increased respiratory resistance has had a significant impact on the quality of life in patients with respiratory system disorders, especially as manifested in relation to activity limitation - (50,13 ± 2,4) vs. (38,32 ± 3,17), and the impact of the disease on the daily lives of patients - (35,26 ± 1,91) vs. (28,58 ± 2,38), as well as on the overall integral index of SGRQ - (43,52 ± 1,85) vs. (36,6 ± 2,22).

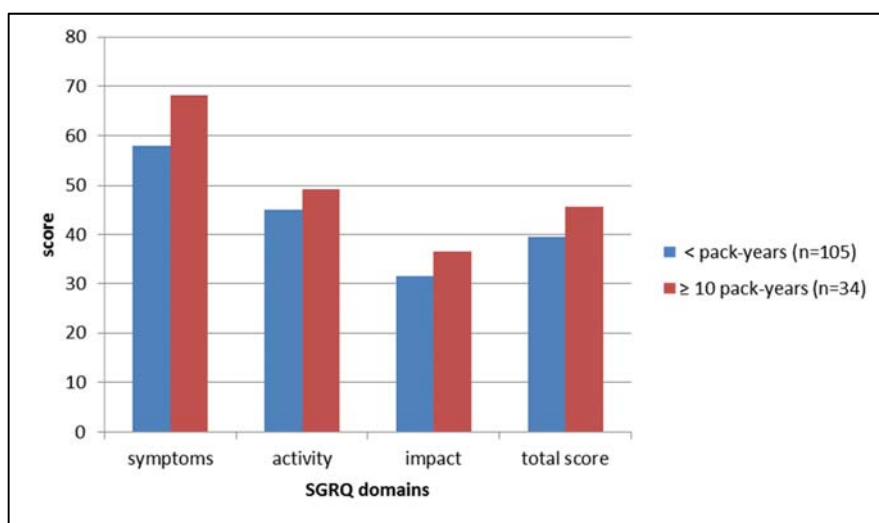
Another factor that negatively affects the course of lung diseases, accelerates the progression of bronchial obstruction and affects life expectancy is smoking. Active smoking is one of the main risk factors for morbidity and mortality, which, fortunately, is being modified [14, 15].

We studied the parameters of QOL in patients with ACO

depending on the smoking experience.

Depending on the number of pack-years of smoking, patients were divided into 2 groups. The first group included patients with a smoking history of 0 to 10 pack-years (never smoked and "light" smokers), and the second group - with experience ≥10 packs-years of smoking.

Prolonged smoking has had a negative impact on the symptoms of the disease, as well as the overall QOL in patients with ACO. In patients with a significant history of smoking, the most serious were abnormal QOL on the symptoms scale, as well as a general indicator of QOL (Fig. 4).



\* -p<0,05; \*\*p<0,01

Fig 4: Changes in the quality of life domains (SGRQ) depending on the smoking experience in patients with ACO.

Prolonged smoking significantly deteriorated the quality of life associated with the symptoms of the disease (symptoms score was (68,11 ± 3,11)). The activity limitation did not

depend on smoking (there was no significant difference), the smoking did not significantly affect psychological and social problems also.

### Summary

In patients with asthma, COPD and their combination significant violations of all components of quality of life were revealed (according to the SGRQ). Activity limitation was more pronounced in COPD and ACO compared with asthma.

In patients with ACO, quality of life worsens with an increase in the degree of bronchial obstruction and with increased respiratory resistance.

The considerable smoking history (more than 10 pack-years) also affects all components of the quality of life.

To prevent the deterioration of the quality of life in patients with obstructive lung diseases and, as a result, high mortality, high rates of hospitalization and increased use of health care resources, early detection of combined pathology of asthma and COPD, rational therapy, and prevention of tobacco-smoking are necessary.

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