

# Clinical and Functional Features of Chronic Obstructive Pulmonary Disease in Russian Primary Health Care

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## ABSTRACT

**Aim:** To reveal the clinical and functional features in patients with COPD in Russian primary health care.

**Methods:** At stage 1, COPD risk factors were assessed among persons with respiratory symptoms (n=525). Stage 2 included screening spirometry. At stage 3, patients with COPD were examined to determine clinical and functional features. The COPD group included 150 patients in age from 45 to 81 years (56.1±2.3 years). According to the GOLD classification, patients were divided into the following groups: group A – 59 patients (39.3%), group B – 30(20%), group C – 29(19%) and group D – 32(21.7%).

**Results:** Mild to moderate COPD was registered in 62% of cases. 88(58.7%) had few symptoms of the disease (mMRC-0-1, CAT <10 points), 62(41.3%) had many symptoms (mMRC-0-1, CAT ≥10 points). There is a correlation between the rate of exacerbations and severity of COPD (r=0,56, p<0,05 ). Most of the patients without exacerbations belonged to group A (45.4%). There were no significant demographic differences between the groups in terms of age, gender, and smoking status (p>0.05). 58.3% of COPD patients had a 1point mMRC score and 41.7% of patients had a score of more than 2.

**Conclusion:** The study revealed a high prevalence of COPD between adults with mild to moderate severity.

**Keywords:** COPD, spirometry, mMRC, CAT.

## INTRODUCTION

Chronic obstructive pulmonary disease (COPD), one of the most common diseases of the respiratory system, is an important medical and social problem due to the growing economic and social burden<sup>1,2,3</sup>. According to WHO forecasts, the prevalence, mortality of COPD will increase in the future. Currently, COPD is the third leading cause of death in the world<sup>4</sup>.

Program GOLD (Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease, 2020) gives the following definition of COPD—is Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development. Significant comorbidities may have an impact on morbidity and mortality<sup>4</sup>.

Diagnosing COPD in primary care is difficult because many of the clinical symptoms are similar to asthma and heart disease, which can lead to misdiagnosis and suboptimal management of the disease.

The gold standard for diagnosing and determining the severity of COPD is the spirometry assessment of objective breathing disorders—the FEV<sub>1</sub> indicator. However, some unresolved questions remain about the clinical significance of this parameter. Leading experts from GOLD point out that FEV<sub>1</sub> correlates weakly with the severity of symptoms, in particular the variability of dyspnea in patients with COPD<sup>1,2,3,4</sup>. According to this clinical questionnaires and scales have importance in the evaluation of respiratory symptoms in COPD. The article provides an analysis of the

clinical and functional characteristics of patients with COPD, which will help primary care physicians to develop and implement an optimal plan for managing patients with COPD.

Patients with COPD usually seek medical help when their symptoms begin to have a significant impact on their daily lives directly or indirectly. Patients are forced to adjust their lifestyles to avoid symptoms. Symptoms are more closely related to the patient's quality of life than airway obstruction<sup>5,6</sup>.

The revision of the GOLD document in the 2014 year proposed a new classification based on an integrated assessment of the severity of COPD. It is included the clinical data about the patient: the number of exacerbations of COPD per year and the severity of clinical symptoms according to the mMRC and CAT test<sup>7</sup>. This classification categorizes patients into 4 groups: Group A (fewer symptoms, lower risk of exacerbations), Group B (more symptoms, lower risk of exacerbations), Group C (fewer symptoms, higher risk of exacerbations), and Group D (more symptoms, high risk of exacerbations). Complex staged examination allows to reveal the degree of obstructive disorders, as well as to form groups of low and high-risk patients with COPD<sup>8,9,10,11,12</sup>. That's why the aim of the study to identify clinical and functional features in patients with COPD in primary health care. Objectives of the study: assessment of risk factors, respiratory symptoms of COPD (cough, shortness of breath, sputum production), spirometric parameters, concomitant pathology in a real outpatient setting.

## MATERIALS AND METHODS

Patients who applied to the State Budgetary Institution of Ryazan Region Polyclinic №12 of the city of Ryazan were

examined. The study was conducted from January 2012 to December 2018. The study was active, observational. Patients were included in the study as they approached.

At the first stage, a screening epidemiological study (questionnaire) was carried out, 525 patients with respiratory symptoms or COPD risk factors were examined. Risk factors for chronic respiratory diseases were assessed, including smoking, occupational and household hazards. In the second stage, spirometry was carried out on all patients. At the third stage, according to the results of spirometry, patients with COPD were identified, the severity of COPD was assessed, and observation groups were formed: A, B, C, D, according to the GOLD 2014 classification.

The group of patients with COPD included 150 patients (87 men and 63 women) aged 45 to 81 years (mean age  $56.1 \pm 2.3$  years).

The inclusion criteria in the study were:

1. Informed consent to participate in the study and sufficient compliance.
2. The presence of chronic respiratory symptoms (the key symptoms for the diagnosis were: chronic cough, chronic sputum production, shortness of breath).
3. The presence of spirometry deviations ( $FEV_1 \leq 80\%$ ,  $FEV_1/FVC < 0.7$  after bronchodilation test).
4. Action of risk factors in anamnesis.

#### Exclusion criteria:

1. The absence of clear signs of COPD in the patient, normal spirometry results.
2. The presence of other diseases (severe stages of chronic heart failure, cancer, anemia, specific pulmonary lesions—sarcoidosis, tuberculosis, etc.)
3. Psychological and social reasons that impeded the implementation of the study.

All patients filled standardized questionnaires and CAT (COPD Assessment Test) and mMRC (modified Medical Research Council) tests, by the latest Russian guideline<sup>1</sup>. The severity of dyspnea was determined using them MRC scales.

Spirometry was performed in the modes of calm breathing and forced expiration according to the ATS/ERS rules using a portable spirometer SMP21/01 (Russia) with the determination of forced vital capacity (FVC), forced expiratory volume in 1 second ( $FEV_1$ ), and in spiratory capacity. Before spirometry, the patient refrained from taking coffee, tea, chocolate, cola or other caffeinated drinks and foods, ice drinks, alcohol for 4 hours, and physical activity 12 hours before the examination. Analyzed  $FEV_1$ , FVC,  $FEV_1/FVC$ , and perform a test for reversibility of air flow obstruction after 40 min after inhalation of ipratropiumbromide in a dose of 160 micrograms<sup>9,10</sup>.

The patients were informed in detail about the aim and objectives of the study, and detailed explanations were given to the questions that arose. Written voluntary informed consent was obtained from all patients before inclusion in the study. The study was approved local ethic committee of Ryazan State Medical University (November 08, 2011, meeting №5).

Statistica 10.0 software (Stat Soft Inc., USA) was used to statistically process the results. Quantitative data

satisfying a normal distribution are presented as mean (M)  $\pm$  standard deviation (SD). To compare the indices of unrelated groups, provided that the distribution in the groups was normal, the Student's t-test was used. Relative indicators were expressed as a percentage. The data obtained during the study were subjected to Spearman's correlation. Values were considered statistically significant at  $p < 0.05$ .

## RESULTS AND DISCUSSION

All patients included in the study had ever smoked (pack-years index was  $24.5 \pm 0.93$  pack per year), 19.3% worked industry conditions for more than one year. Complaints of persistent coughing were reported by all surveyed (100%). Sputum production indicated 35.2% of patients, shortness of breath—51.2% of patients.

According to GOLD 2014 classification of obstruction – Stage I COPD was registered in the study conducted in 28 patients (18.7%), stage II—in 65 (43.3%), stage III—in 45 (30%), stage IV—in 12 (8%). It is important to note that from all 150 patients with diagnosed COPD, only 10 patients early knew about their diagnosis, while 6 had stages III and IV of the disease. According to the classification GOLD, 2014, patients were divided into the following groups: Group A – 59 patients (39.3%), a group of B – 30 (20.0%), C – 29 group (19%), and group D – 32 (21.7%).

The spirometry parameters were assessed: in patients with stage I of the disease, the mean value of  $FEV_1$  was  $89.04 \pm 1.5\%$ ,  $FEV_1/FVC$ — $67.8 \pm 2.16\%$ , in patients with stage II the mean value of  $FEV_1$  was  $66.1 \pm 0.83\%$ ,  $FEV_1/FVC$ — $62.6 \pm 2.67\%$ . The mean value of  $FEV_1$  in patients with stage III of the disease was  $40.1 \pm 1.6\%$ , with stage IV— $25 \pm 2.53\%$ . Table 1 shows the comparative characteristics of patients with COPD at various stages of the disease.

Of 150 patients, 88 (58.7%) had few symptoms of the disease (mMRC 0-1, CAT < 10 points), 62 (41.3%) had many symptoms (mMRC > 1, CAT  $\geq$  10 points).

Exacerbations of COPD were determined by the use of antibiotics, systemic glucocorticosteroids (GCS), and hospitalization of patients. The number of exacerbations of COPD increased in the spring and autumn and averaged 1 to 8 per year. A direct correlation was found between the frequency of exacerbations and the severity of COPD ( $r = 0.56$ ,  $p < 0.05$ ). So, for stage I COPD, the frequency of exacerbations averaged 1.3 cases per year, for stage II—1.9, for stages III and IV—2.4 and 3.5, respectively. Most of the patients without exacerbations belonged to group A (45.4%).

42.7% of patients were vaccinated against influenza. vaccination against influenza made it possible to reduce the rate of exacerbations of the disease and the severity of their course and, thereby, reduce the number of days of disability and improve the rate of bronchial patency. In vaccinated patients with COPD after 12 months, the frequency and duration of exacerbations decreased by 1.9 and 1.4 times, respectively, and after 18 months—1.7 and 1.1 times ( $p < 0.05$ ).

Among the comorbidities, the most frequently reported: ischemic heart disease (53.2%), arterial

hypertension (74.3%), chronic gastroduodenitis (34.5%). In 31.3% of cases, there was a combination of 2 or more chronic diseases. There were no significant demographic differences between the groups in terms of age, gender, and smoking status ( $p > 0.05$ ). The prevalence of comorbid conditions was comparable to that in the division of patients into stages of COPD, except of coronary heart disease, which, according to our analysis, was more common in patients in groups B and D ( $p < 0.05$ ). The percentage of patients with overweight and obesity was higher in group B ( $p < 0.05$ ).

58.3% of COPD patients had an mMRC score equal to 1 and 41.7% of patients had an mMRC score  $\geq 2$ . At the same time, it was revealed that at I and II stages of COPD there were cases of very pronounced dyspnea, and vice versa, among patients with III and IV stages there were those in whom dyspnea was estimated at one point.

Figure 1. Groups of COPD, according to ABCD classification (GOLD 2014).

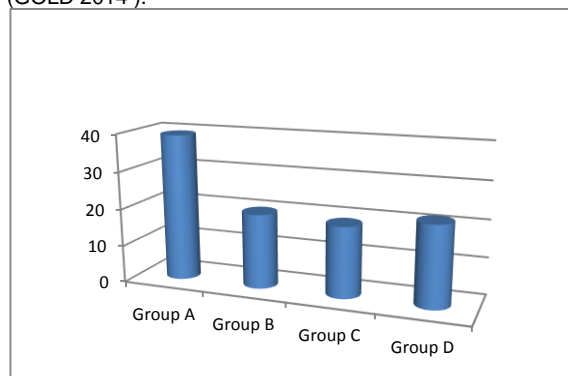


Table 1. Values of the main spirometric parameters in the observation groups of patients with COPD

Indicators	COPD patients (n = 150)			
	Stage I (n=28)	Stage II (n=65)	Stage III (n=45)	Stage IV (n=12)
FVC, l/s	3,34±0,42	3,24±0,49	2,2±0,61	1,82±0,29
FEV <sub>1</sub> , l/s	2,6±0,32*	2,06±0,32*	1,10±0,21*	0,73±0,09*
%	89,04±1,5	66,1±0,83	40,1±1,6	25,0±2,53
FEV <sub>1</sub> /FVC, %	67,8±2,16	62,6±2,67	54,2±2,89	44,6±4,3

Note : \* - the difference between the compared values and statistically significant ( $p < 0.05$ )

## CONCLUSION

This study revealed a high prevalence of COPD in the adult population of Polyclinic №12. This is associated, on the one hand, with a real increase in the prevalence of COPD, due to the high frequency of risk factors affecting urban residents, and on the other hand, this is a consequence of COPD under diagnosis, since in the early stages the asymptomatic course of the disease (from 5 to 15 years) leads to late patient appeal ability for medical care and late detection of the disease.

The analysis demonstrated the possibility and convenience of using stratification of patients with COPD according to the severity of the disease (according to GOLD 2014) to individualize the further management of such patients. Assessment of the severity of COPD, based on the assessment of the symptoms of the disease, spirometry data, the frequency of exacerbations, comorbidities, allows the formation of high and low-risk groups of patients with COPD, as well as more quickly to achieve control over the disease.

The bulk of COPD patients in a study with mild and moderate severity of COPD (62%), are not diagnosed and, therefore, were not under dispensary supervision and did not receive adequate basic therapy.

## REFERENCES

1. Chronic obstructive pulmonary disease. Clinical guidelines of Russian Respiratory Society. 2018. Available from URL: [https://spulmo.ru/upload/federal\\_klinicheskie\\_rekomendaciy\\_hobl.pdf](https://spulmo.ru/upload/federal_klinicheskie_rekomendaciy_hobl.pdf).
2. Vizel A.A., Vizell Yu. Chronic obstructive pulmonary disease: state of the problem. *Lechashchiy vrach*. 2016;4:78-86. (In Russ.)

3. Vizel A.A., Salakhova I.N., Vizel I.Yu., Vafina A.R., Shakirova G.R., Kudryavtseva E.Z. Patients with chronic obstructive pulmonary disease: an analysis of real clinical practice. *Consilium Medicum*. 2018;20(3):35-39.
4. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. (2021 Report). Available from URL: [https://goldcopd.org/wp-content/uploads/2020/11/GOLD-REPORT-2021-v1.1-25Nov20\\_WMV.pdf](https://goldcopd.org/wp-content/uploads/2020/11/GOLD-REPORT-2021-v1.1-25Nov20_WMV.pdf).
5. Carone M., Antoniu S., Baiardi P., Digilio VS, et al. QuESS Group Predictors of Mortality in Patients with COPD and Chronic Respiratory Failure: The Quality-of-Life Evaluation and Survival Study (QuESS): A Three-Year Study. 2016;13(2):130-8. doi: 10.3109/15412555.2015.1067294.
6. Van der Molen T., Miravittles M., Kocks JW COPD management: role of symptom assessment in routine clinical practice. *Int J Chron Obstruct Pulmon Dis*. 2013;8:461-71. doi: 10.2147/COPD.S49392.
7. Tsiligianni, I.G., van der Molen, T., Moraitaki, D. et al. Assessing health status in COPD. A head-to-head comparison between the COPD assessment test (CAT) and the clinical COPD questionnaire (CCQ). *BMC Pulm Med*. 2021;12:20. doi:10.1186/1471-2466-12-20.
8. Cazzola M., MacNee W., Martinez FJ, et al. Outcomes for COPD pharmacological trials: from lung function to biomarkers *Eur Respir J*. 2008 Feb;31(2):416-69. doi: 10.1183/09031936.00099306.
9. Kotlarov S.N. Spirometry screening in evaluation of chronic obstructive pulmonary disease at primary care. *Russian medico-biological bulletin named after academician I.P. Pavlova*. 2011;1:91-95. (In Russ.)
10. Abrosimov V.N., Shutov V.I. Comprehensive assessment of the action of ipratropium bromide in patients with chronic obstructive pulmonary disease. *Russian medico-biological bulletin named after academician I.P. Pavlova*. 2004;3-4:181-185. (In Russ.)
11. Ponomareva I.B., Subbotin S.V. Possibilities of volumetric capnography method in the study of pulmonary functions in patients with copd *Science of the Young - Eruditio Juvenium*. 2016; 1:68-73. (In Russ.)
12. Demko I.V., Kudelya L.M., Sobko E.A., Solov'eva I.A., Trofimenko I.N., Teteneva A.V. et al. Diagnostic and treatment options for patients with COPD as part of real clinical practice. Approaches to the treatment of patients with various phenotypes according to GOLD (2019): materials of the Council of Experts of the Siberian Federal District, Chita and Buryatia. *Pulmonologiya*. 2020;30(2):245-251. doi:10.18093/0869-0189-2020-30-2-245-251. (In Russ.)