

FACTORS ASSOCIATED WITH DECLINE OF FEV1 IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Chronic obstructive pulmonary disease (COPD) is a major cause of illness and death worldwide [19]. As a chronic disease COPD is prone to progress for years and mortality rate is associated with both disease severity and its complications. Since 2016 COPD has been considered as the third-leading cause of death worldwide [3,8] and consequently the great problem in healthcare system in the terms of disease prevention and management [2]. According to the WHO COPD is reported as a global challenge for the modern health care system. Mortality rate due to the disease accounts for 2.75 million cases annually and it is predicted to increase disease morbidity and mortality due to environmental pollution as well as prolongation of lifetime of population in the future.

Chronic obstructive pulmonary disease is a heterogeneous, chronic inflammatory process of the airways often involving destruction of adjacent alveoli and vasculature. Symptoms range from chronic productive cough to debilitating dyspnea. Disease trajectory can vary from years of stability to devastating acute exacerbations and respiratory failure [9]. Exacerbations or episodes of acute worsening of the respirator symptoms are general characteristic of COPD. Exacerbations itself accelerate the decline in lung function resulting in reduction of physical activity, quality of life, and increased risk of death. The main characteristic of the lung function is forced expiratory volume in one second (FEV₁), the maximum amount of air that the subject can forcibly expel during the first-second following maximal inhalation [11]. FEV₁ can be used to assess lung function capacity and categorize the severity of COPD.

Decline of FEV₁ as a direct indicator for the lung function capacity is one of the most unfavorable prognostic sign of COPD, associated with deterioration of lung function, frequency of disease exacerbations and increased risk of mortality [5,24,25]. Despite the importance of the issue factors that are associated with progressive decline of FEV₁ in COPD, is still area of challenge in medicine. Active smoking and frequency of exacerbations reliably correlate with the dynamics of FEV₁ decline [13]. Smokers are at greater risk of premature mortality than nonsmokers in COPD [15]. The other factor that may be related to disease progression and poor outcome is possibly the obesity. Although there is no evidence regarding the impact of body mass index (BMI) on severity and prognosis of COPD [4,21,20,23]. So, assessment of those relations are both useful and important [10]. At the same time, there is heterogeneous information regarding the influence of such factors as age, comorbidity and duration of COPD on disease progression and severity, mMRC (Modified Medical Research Council Questionnaire) gradation, Functional Questionnaire score, COPD duration, which are in correlation with FEV₁ progressive deterioration during COPD [21,16] The quite ambiguous data raises questions and needs for more profound and thorough investigations regarding the risk factors and predictors that contribute to more severe forms of the disease, frequency of exacerbations and poor outcome [1,6,17,18]. Identification of risk factors and reduction their exposure are important steps in prevention, management and prognosis of COPD.

According to the above mentioned the purpose of the study is to trace and reveal the correlation between the deterioration of FEV₁ and those risk factors that may be associated with the worsening of lung function in order to develop disease management strategy to prevent progression and improve the outcome of the disease.

Purpose of the study was to investigate the correlation between the pulmonary functional indexes, including FEV₁ and various risk factors that deteriorate lung functional capacity and cause poor outcome of COPD. Study results will promote better understanding of COPD's risk stratification which will improve disease management and outcome by prevention of modifying risk factors. The clinical evaluation of the patients with COPD included: gender, age, BMI, tobacco consumption (active or ex-smoker), history, presence of comorbidities; The severity of COPD was assessed by MMRC, CAT questionnaires, GOLD (Global Initiative for Chronic Obstructive Lung Disease) criteria, frequency of the disease exacerbations (determined as deterioration of COPD symptoms, that requires treatment with antibiotics or/and with glucocorticoids, or hospitalization).

Material and methods. The study was conducted at the L.T.D. "N. Kipshidze Central University Clinic". Pulmonary functional status was assessed by spirometry. To identify the severity of the disease we used criteria provided by GOLD [8].

The study included 78 patients. Demographic and clinical characteristics of the patients are given : Gender- Male -50 (64,10%), Female- 28 (35,90%), Age 61,56±10,72, Age of starting COPD complaints-54,92±10,52, Duration of COPD-6,64±4,05, Former Smoker-50,00 (64,10%), Smoker-28,00 (35,90%), P/Y-35,21±25,72, Duration of smoking-28,45±10,77, BMI-28,45±10,77, Normal Body Mass-20(25,64%), Excessive weight-18(23,08%), Obesity-40(51,28%), Treatment in History- Was not treated-26 (33,33%), Salbutamol-28(35,90%), Combined therapy-24 (30,77%), Exacerbation in history- No - 62 (79,49%), Yes - 16(20,51%), mMRC-gradation- Grade2-42(53,85%), Grade3- 36(46,15%), Questionnaire on Lung function-12,36±2,78, Arterial Hypertension-70(89,74%), CAD. angina of effort -26 (33,33%), Heart failure-10(12,82%), Atrial fibrillation-2 (2,56%), Type 2 diabetes -16(20,51%), Dyslipidemia -38(48,72%), Chronic kidney disease -2 (2,56%).

Identify the risk-factors that influence on severity, prognosis and outcome of COPD multiple regression analysis (Pearson coefficient R², reliability considered as the value p<0.05) was performed including such factors as: age, BMI (kg/m²), smoking (age/pack), comorbidity, duration of COPD, frequency of hospitalization due to exacerbation. We also used mMRC (Modified Medical Research Council Questionnaire) gradation, Functional Questionnaire score.

Results and discussion. Statistically reliable correlation was not revealed between COPD severity and such factors as presence of comorbidity and Functional Questionnaire score. As to tobacco consumption, there was not revealed statistically reliable correlation, although smoking is among reliably proved risk-factors that provoking progression of the disease. Relationship of disease severity with other risk-factors and their statisti-

Table 1. Correlation Coefficients and Reliability values determined by Multiple linear regression pattern

#	Risk-factor	Coefficient	Coeff	SE	t-stat	p-value
		b	-5.3668	2.2012	-2.4381	0.0159
F1	Age	β_1	-0.2841	0.1051	-2.7042	0.0076
F2	BMI	β_2	-1.9836	0.0875	22.6767	< 0.0001
F5	mMRC	β_5	-7.4719	2.6276	2.8436	0.0051
F7	COPD Duration	β_7	-1.0925	0.2838	3.8497	0.0003
F8	Hospitalization Frequent Cases in Anamnesis	β_8	- 0.1895	0.3221	-0.2808	0.0056

cal reliability is provided in Table 1.

Study results demonstrated that COPD severity (based on FEV1 value) is statistically reliably related to frequent hospitalization due to disease exacerbation. Therefore, prevention of exacerbations is one of the main goals in managing COPD. Statistically reliable relationships were revealed between the severity of COPD and such factors as age, BMI, mMRC gradation, disease duration.

Conclusion. Take into account the study results we can conclude the following:

1. Early identification of COPD as well as early beginning of adequate treatment are essential in slow down the progression of the disease and consequently results in the development of less severe forms and more benign outcome of the disease.
2. Overweight and obesity are the risk-factors that should be considered as predictors of more severe forms of COPD.
3. Self-Assessment Questionnaire (mMRC gradation - Modified Medical Research Council Questionnaire) is important screening test to predict more severe course of the diseases.
4. Adequate management and prevention of hospitalization due to exacerbations in COPD are essential to maintain functional status of the lungs and provide more benign outcome of the disease.

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SUMMARY

FACTORS ASSOCIATED WITH DECLINE OF FEV1 IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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The purpose of the study was to search for a correlation between FEV1 and the possible predictors that determine disease progression and lung function deterioration in COPD patients.

The research was conducted at N. Kipshidze Central University Clinic. 78 COPD patients participated in it. Spirometry was used to diagnose the participants and GOLD guidelines for COPD were applied to estimate stages of disease severity.

Multiple regression analysis were conducted in order to estimate severity of COPD and its risk factors. The research revealed statistically significant correlation between lung function deterioration and the factors such as age, BMI, duration of COPD, hospitalization frequency due to COPD exacerbation based on the patient's anamnesis and self-assessment questionnaire for dyspnea. It can be considered statistically significant that early diagnosing of COPD and therefore timely and adequate treatment, prevention of disease exacerbation and adherence to a healthy lifestyle notably determines severity of the disease and its prognosis.

Statistically significant correlation that was revealed between FEV1 and dyspnea self-assessment questionnaire increases the clinical value of this questionnaire in estimating COPD severity.

Keywords: lung function deterioration, forced expiratory volume in one second (FEV₁), chronic obstructive pulmonary disease (COPD), pulmonary functional status, spirometry.

РЕЗЮМЕ

ФАКТОРЫ, АССОЦИИРОВАННЫЕ С УХУДШЕНИЕМ FEV1 ПРИ ХРОНИЧЕСКОЙ ОБСТРУКТИВНОЙ БОЛЕЗНИ ЛЕГКИХ

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Целью исследования явилось определение возможных предикторов, ассоциированных с прогрессированием болезни и ухудшением функционального состояния легких у больных хронической обструктивной болезнью легких. Исследование проведено на базе Центральной университетской клиники им. Н. Кипшидзе. В исследовании участвова-

ли 78 больных хронической обструктивной болезнью легких (ХОБЛ). Функциональное состояние легких оценивалось посредством спирометрии. При определении степени тяжести болезни учитывались критерии, представленные Глобальной инициативой по ХОБЛ (Global Initiative for Chronic Obstructive Lung Disease).

Множественный регрессионный анализ использован для определения степени тяжести и прогностических факторов риска ХОБЛ. Статистически значимая корреляция выявлена между нарушением легочной функции и такими факторами, как возраст, индекс массы тела, продолжительность ХОБЛ, частота госпитализаций ввиду обострений ХОБЛ и показатели Шкалы субъективной оценки одышки (ШСОО). Своевременное выявление и, соответственно, адекватное лечение ХОБЛ, а также профилактика обострения заболевания и ведение здорового образа жизни в значительной степени определяют тяжесть заболевания и его прогноз. Выявленная статистически значимая корреляция между FEV-1 и ШСОО повышает клиническую ценность Шкалы субъективной оценки одышки при определении степени тяжести ХОБЛ.

რეზიუმე

ფილტვების ქრონიკული ობსტრუქციული დაავადების დროს FEV 1-ის გაუარესებასთან ასოცირებული ფაქტორები

ქ. ლობჯანიძე, მ. სულაქველიძე, რ. თაბუკაშვილი

აკად. ნ. ყიფშიძის სახ. ცენტრალური საუნივერსიტეტო კლინიკა, თბილისი, საქართველო

კვლევის მიზანს წარმოადგენდა პაციენტებში ფილტვების ქრონიკული ობსტრუქციული დაავადებით FEV1-ის კორელაციის ძიება იმ შესაძლო პრედიქტორებთან, რომლებიც დაავადების პროგრესირებას და ფილტვის ფუნქციური მდგომარეობის გაუარესებას განაპირობებენ.

გამოკვლეულია 78 პაციენტი აკად ნ. ყიფშიძის სახ. ცენტრალური საუნივერსიტეტო კლინიკის ბაზაზე. დიაგნოზი დადგენილი იყო სპირომეტრიული კვლევით, ხოლო დაავადების სიმძიმის სტადიის დადგენა განხორციელდა GOLD-ის მიერ მოწოდებული კრიტერიუმებით.

ფილტვების ქრონიკული ობსტრუქციული დაავადების (ფქოდ) სიმძიმის და პროგნოზის რისკ-ფაქტორების გამოსავლენად ჩატარდა მრავლობითი რეგრესიული ანალიზი. სტატისტიკურად სარწმუნო კავშირი გამოვლინდა ფილტვის ფუნქციური მდგომარეობის გაუარესებასა და ისეთ ფაქტორებს შორის, როგორცაა ასაკი, სხეულის მასის ინდექსი, ფქოდ-ის ხანგრძლივობა, ანამნეზში ფქოდ-ის გამწვავების გამო ჰოსპიტალიზაციის სიხშირე და დისპნოეს თვითშეფასების სკალის მაჩვენებლები. სარწმუნოდ შეიძლება მივიჩნიოთ, რომ ფქოდ-ის დროული გამოვლენა და, შესაბამისად, დროული და ადეკვატური მკურნალობა, დაავადების გამწვავების პრევენცია და ცხოვრების ჯანსაღი წესის დამკვიდრება მნიშვნელოვნად განსაზღვრავს დაავადების სიმძიმეს და მის პროგნოზს. სტატისტიკურად სარწმუნო კავშირი გამოვლენილია FEV-1-სა და დისპნოეს თვითშეფასების სკალის მაჩვენებლების შორის ზრდის კოეფიციენტის კლინიკურ ღირებულებას ფქოდ-ის სიმძიმის შეფასებისას.