

State of Inhalation of Glycrosine on Ventilation-Perfusion Parameters of Patients with Chronic Obstructive Pulmonary Disease

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Abstract: The dynamics of ventilation parameters, as well as exercise tolerance, were studied in 78 patients with chronic obstructive pulmonary disease treated with glycrosine inhalation. In the course of the research, a positive dynamics of ventilation indicators was established, all the main indicators of the function of external respiration improved, and exercise tolerance increased. Complex treatment of patients with COPD using inhalation of glycrosine (IG) leads to a significant reduction in a number of the main clinical manifestations of the disease during the first 10 days of treatment and continues throughout the course of therapy.

Keywords: chronic obstructive pulmonary disease, respiratory function, exercise tolerance, inhalation of glycrosine.

Introduction

Chronic obstructive pulmonary disease (COPD) is one of the most common diseases of internal organs; it occurs in 5 - 7% of patients over 40 years of age and is one of the most common causes of death [2, 4]. "The diagnosis of COPD in clinical practice requires objective spirometric confirmation of the presence of airway obstruction that does not return to normal after treatment" [1, 6]. The main functional syndromes in COPD are: impaired bronchial patency, changes in the structure of static volumes, impaired elastic properties and diffusion capacity of the lungs, decreased physical performance.

The diagnosis of COPD is to a large extent a functional diagnosis and it is quite natural that the methods that allow to identify precisely the violations of bronchial patency, to determine their severity and degree of reversibility seem to be the most important and play a primary role in the final clinical diagnosis, and ultimately make it possible to assess the effectiveness of the treatment.

Due to the widespread prevalence of COPD, direct medical and indirect costs associated with morbidity and premature mortality can pose a serious economic and social problem for society, population and health authorities [3]. Experts from the European Respiratory Society believe that adequate treatment, which requires significant financial costs, can significantly

improve the quality and duration of life of patients suffering from this chronic progressive disease. Currently, one of the main directions in the treatment of COPD is long-term bronchodilatory therapy, which makes it possible to reduce the duration of the symptoms of the disease, reduce the frequency and severity of exacerbations, improve exercise tolerance and quality of life of patients.

The flora of our republic is rich in medicinal plants, among which one can single out the naked licorice. Naked licorice has been used for a long time for diseases of the respiratory tract in the practice of oriental medicine. Avicenna very often mentioned licorice in his "Canon" as a means "facilitating the work of the bronchi, removing all sorts of fluids and mucus." On the basis of licorice extract - glycyrrhizic acid, a number of bronchodilators have been created. However, with the advent of powerful secretory drugs, its use has receded into the background. On the other hand, the presence of mineralocorticoid abilities in HA seriously limited its use: when prescribed in therapeutically significant dosages (300 mg per day), sodium and water retention and an increase in blood pressure were noted. Studies carried out in our Center have shown that glycyrrhizic acid, without breaking down, penetrates the body during inhalation, also during electrophoresis from the anode, in an amount of up to 30%, is well deposited in the subcutaneous fat layer and has a resorptive effect [5, 7]. For this reason, the purpose of our research was to find and introduce alternative ways of using this unique natural remedy in the complex therapy of COPD.

Purpose of the study, to study the dynamics of ventilation parameters and exercise tolerance during treatment with inhalation of glycerosine (IG) during complex therapy of patients with chronic obstructive pulmonary disease.

Materials and Methods

The study was carried out in 78 patients with COPD in the acute stage. The average age of the patients was 56.1 ± 1.9 years. There were 50 men, 28 women. All patients complained of cough (100%) with scanty sputum (58%) and shortness of breath (100%). 32 patients with COPD of varying severity were examined once in the first days of hospitalization, the remaining 46 patients with COPD were examined upon admission to the hospital, after 10 days of complex treatment with the inclusion of IG.

IG was carried out from the apparatus "compressor inhaler LD-2100", while 3 ml-3% glycerosin solution + 3 ml of physical. solutions were included in the container of the inhaler for drugs and the procedure through the mouthpiece lasted for 10 minutes.

The selection of patients was carried out on the basis of a comprehensive examination, which included clinical, biochemical, immunological, instrumental research methods.

The state of the function of external respiration (FER) was studied according to the data of pneumotachometry. In the first days of hospitalization, after 10 days, 2 times / day and after 1 month, inhalation of glycerosin 1 time / day. Vital capacity of the lungs (VCL), forced expiratory volume in 1 second (FEV_1), ratio of forced expiratory volume in 1 second

to lung vital capacity ($FEV_1 / VC, \%$), peak expiratory flow rate (PER), the maximum forced expiratory flow rate at the level of 25%, 50%, 75% of forced vital capacity of the lungs maximum volumetric expiratory flow rates ($MVEFR_{25}$, $MVEFR_{50}$, $MVEFR_{75}$), VCL, residual lung volume (ROV), the ratio of residual volume to VCL (ROV / VCL). To determine the degree of ventilation failure and exercise tolerance, a 6-minute step test was performed, at the end of which the distance traveled in meters was estimated.

Results and Discussion

According to FER, there was a decrease in the ventilation-perfusion state of the bronchopulmonary system in all patients with pulmonary hypertension. So, the FEV_1 indicator was $38.2 \pm 0.5\%$ in group 1, in group 2. $-46.1 \pm 1.6\%$, ($p < 0.005$), SaO_2 , respectively, in 1 - $85.1 \pm 5\%$ and in 2 $89.6 \pm 1.4\%$ ($p < 0.05$), which is typical for an increase in bronchial obstruction.

The analysis of ventilation parameters in the group of patients receiving IG showed its good efficiency, which was manifested by an increase in the main parameters of the respiratory function under study. So, after 10 days of therapy with the inclusion of inhalation of glycerosine, there was an increase in volumetric parameters.

The data of a 6-minute step test also showed an increase in the test performed by 12% after 10 days of using the drug (table 1).

Table 1

Dynamics of ventilation parameters and exercise tolerance in patients with COPD against the background of complex treatment with IG

Indicators	Indicator growth, %	
	During treatment with IG	Control group
	After 10 days	
VCL	+15,8	-3,4
FEV_1	+25,4	+3,0
PER	+22,7	-17
$MVEFR_{25}$	+34	+1
$MVEFR_{50}$	+36,5	+13,4
$MVEFR_{75}$	+24	+19,9
6 minute walk test	12	5

After 30 days of therapy, in many indicators, the trend towards an increase in indicators remained: VCL - by 19.6%, FEV_1 - by 25.4%, PER - by 22.7%, $MVEFR_{25}$ - by 37.4%,

MVEFR₅₀ - by 36.5 %, MVEFR₇₅ - by 14%, decrease in ROV - by 24.8% and ROV / VCL ratio - by 21%. Exercise tolerance for 30 days of the drug increased by 25.5%.

On the contrary, in the control group, we did not find significant changes in functional indicators, less than that, some indicators were reduced against the background of basic therapy. So, by the 10th day of therapy, the increase in FEV1 was 3%, MVEFR₂₅ - 1.0%, MVEFR₅₀ - 13.4%, MVEFR₇₅ - 19.9%, there was a decrease in the VCL indicator - by 2.4%, PER - by 17 %, an increase in the residual volume by 89%, and the ROV / VCL ratio by 29.2%, which indicates an increase in the severity of emphysematous manifestations. The data of a 6-minute step test show an insignificant increase in the first 10 days of basic therapy, which was 5%, and a month later, when the test was repeated, a decrease in exercise tolerance was noted by 13%.

Along with the improvement in functional parameters, there was a significant decrease in the severity of clinical symptoms of COPD in patients who took inhalation of glycerosine. So in patients by the 10th day of treatment, it was possible to achieve a decrease in cough 1.5 times, the amount of sputum secreted decreased by 1.3 times, and the severity of shortness of breath decreased by 1.8 times. By the end of 1 month of taking the drug, these symptoms decreased by 2.1; 2.2 and 2.2 times, respectively (table 2).

Table 2

Clinical results of complex treatment with IS in patients with COPD

Clinical symptom scores	Research stages		
	Before treatment	Через 10 дней	After 1 month
Dyspnea	2,2±0,2	1,2±0,2	1,0±0,2*
Cough	2,6±0,1	1,8±0,1	1,2±0,1*
Excretion of sputum	2,4±0,1	1,8±0,1	1,1±0,1*

Note: * - reliability of differences between groups at the beginning of therapy and after 1 month. - p <0.001.

The results of our work are consonant with the results of other similar studies [2, 7], which established a significant increase in functional pulmonary parameters in patients with COPD during therapy with IG, accompanied by an improvement in the clinical picture and quality of life of patients.

Conclusion

Thus, in the course of the conducted studies, a positive dynamics of ventilation indicators was established, all the main indicators of the function of external respiration improved, and exercise tolerance increased. Complex treatment of patients with COPD with the use of IG leads to a significant decrease in a number of the main clinical manifestations

of the disease within the first 10 days of treatment and continues throughout the course of therapy.

The conducted studies allow us to conclude that inhalation of glycerosine, providing high clinical and functional efficacy in the treatment of patients with COPD, is a well-effective drug in the basic therapy of chronic obstructive pulmonary disease.

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