ISSN 1477-9315

JOURNAL OF ENVIRONMENTAL HEALTH RESEARCH

Journal of environmental health research. Volume 1 Issue 2 2022
ISSN 1477-9315 http://www.jehr-online.org/
https://doi.org/10.5281/zenodo.7261021
Universal impact factor 7.2

Journal of environmental health research. ISSN 1477-9315

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Journal of environmental health research.
ISSN 1477-9315 http://www.jehr-online.org/
36 Victoria Road London N59 7LB

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ISSN 1477-9315 http://www.jehr-online.org/
https://doi.org/10.5281/zenodo.7261021
Universal impact factor 7.2

CONSEQUENCES OF CHRONIC HEART FAILURE IN THE DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease in patients with bronchial obstructive disease that has significant manifestations in the lungs and beyond. It is characterized by constant restriction of an air stream. Usually the clinical course of the disease increases and depends on the pathogenic action of toxic particles or gases that cause chronic inflammation in the lungs. Identification of pathogenetic mechanisms that cause the occurrence of complications and their treatment is one of the urgent problems of our time.

Keywords: chronic obstructive pulmonary disease, chronic heart failure, treatment, pro-BNP, endothelium.

Annotation. Studies by the European Society of Cardiology show that among hospitalized and outpatients, the all-cause mortality rate is 17% and 7%, respectively, and hospitalizations are 44% and 32%, respectively [1,3,5,8,9,10]. Most deaths in CHF patients (both in hospital and outpatient settings) are due to cardiovascular causes, which are associated with sudden cardiac death (primary cardiac arrest) and worsening CHF. Various levels of CHF have been identified in hospitalized patients with COPD complications and have caused difficulties in treatment. Therefore, the development of therapeutic strategies for the treatment of pathology complicated by COPD with CHF is especially relevant [4,6,11,12,] .

Data on diagnostics, modern methods of treatment, as well as the author's approach to the scientific solution of this problem are analyzed. The above cases show the relevance of the problem of internal diseases and encourage the study of issues of practical importance [2,7,13,14,15].

Materials and methods. Based on the purpose of the study, medical history and age history of patients were studied in three comparative groups. According to the

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ISSN 1477-9315 http://www.jehr-online.org/
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results of the study, the first initial group consisted of 110 patients with CHF and COPD stages II-III: 34 women (30.9%) and 76 men (69.09%). In the second control group, 50 patients with CHF were examined, including 21 women (42%), 29 men (58%) and 30 healthy people in the third control group, including 15 men (50%) and 15 women (50%) .

This study is based on the results of a survey of 110 patients of the main group with CHF and COPD stages II-III: 34 women (30.9%), 76 men (69.09%). In the second control group, 50 patients with CHF were examined, including 21 women (42%), 29 men (58%), 30 healthy people in the third control group, including 15 men (50%) and 15 people. fifty%).

From 2019 to 2021, patients who came to the therapeutic room of the admissions department were examined in the first therapeutic department of the SAMPMC.

Based on the purpose of the study, medical history and age history of patients were studied in two comparative groups.

The first (main) group consisted of 60 patients under the age of 50 years (20 women - 33.33%; 40 men - 66.66%). There were 50 patients over 50 years of age (14 women 28%; 36 men 72%).

The second (control) group consisted of 30 patients under the age of 50 years (12 women - 40%; 18 men - 60%). There were 20 patients over 50 years of age (9 women 45%; 11 men 55%).

The first group of patients under the age of 50 years - 21-50 years old, mean age - 36.8 ± 0.7 years, age of patients over 50 years old - 51-76 years old, on average 61.0 ± 0.6 years. compact.

The second group of patients younger than 50 years old - 20-50 years old, mean age 35.6 ± 0.6 years, patients older than 50 years old - 51-70 years old, mean age 56.0 ± 0.7 years. years. compact.

Table 1

Clinical features of patients of the main group

Indicators		**Average age**	**Minimum age**	**Maximum age**
Age		48,9	21	76
		patients	% of the total number of patients in the group	
Gender	Men	76	69,09 %	
	Women	34	30,9 %	
Body mass index kg/m2		27,8 (25,2; 29,7)		
CHF	NYHA I	20	18,18 %	
	NYHA II	38	34,54 %	
	NYHA III	52	47,27 %	
Average number of hospitalizations per year		3		
COPD	I	23	20,9 %	
	II	53	48,18 %	
	III	34	30,9 %	
Duration of smoking		32 [28; 36]		

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Emphysema		41	37,27 %
Pulmonary hypertension (EchoCG)	I	38	34,54
	II	9	8,18
	III	3	2,72

Results. The first main group examined 110 patients with COPD complicated by chronic heart failure. The first control group consisted of 50 patients with CHF, and the second control group consisted of 30 healthy people. The use of static methods to assess differences required the creation of groups based on sex, age, duration, and disease severity.

At the initial stage of the study, a cross-sectional analysis of all groups of patients was carried out to determine the characteristics of CHF in the treatment of patients with COPD complicated by chronic heart failure.

The main correlations were typical for CHF: proBNP (r = -0.73), the CHF clinical status assessment scale (SHOKS) (r = 0.71), 6-minute walking test, LV EDV and LV EF, as well as a questionnaire for EQ -5D-5L - there is a correlation.

Interestingly, the correlation between the BODE proBNP score and the EQ-5D-5L health assessment questionnaire that characterizes the ICU is of great interest, and it is important to determine proBNP in the ICU. The results of the correlation analysis of post-systolic and post-diastolic parameters of the left ventricle with functional tests are presented, reflecting the interdependence of parameters characterizing the functional class of CHF. LV EDV (r = 0.93) showed a moderate and strong direct correlation between the main tests.

Patients admitted to the hospital presented complaints inherent in both CHF and COPD: palpitations due to physical and psycho-emotional stress, discomfort behind the sternum, shortness of breath, constant intake of short-acting b2-agonists, peripheral edema, general weakness, and rapid breathing. Given the need for differential diagnosis of symptoms of dyspnea in COPD and CHF, the level of NT-proBNP in the blood was determined in all patients.

The level of NT-proBNP was determined to determine the functional class of CHF. These results are described in Table 2.

Table 2

Levels of NT-proBNP in the CHF group

1 group		
(n=110)	**VF>40% (n=76)**	**VF <40% (n=34)**
2755 [1260; 3781]	**1068 [1025-2062]**	**1793 [1010-2358]**
p<0.01		
2 group		
(n=50)	**VF >40% (n=28)**	**VF <40% (n=22)**
2593 [978; 3714]	**1028 [979-1699]**	**1401 [1065-1789]**
p<0.01		

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Significant increases in fibrinogen and pro-inflammatory cytokines were observed in both groups during analysis for signs of inflammation. In addition, in group 1, these changes were more pronounced, indicating a more pronounced systemic inflammatory response in patients with COPD. All inflammatory symptoms were slightly higher in the 2nd main subgroup, but significant differences were noted only for fibrinogen and IL-6. Elevated levels of pro-inflammatory cytokines were also found, but significant differences were noted in both groups for IL-8 only, indicating a lack of anti-inflammatory potential (Table 3).

Cytokine activity was significantly increased in patients with COPD complicated by CHF and in a comparable group with CHF, in contrast to the group with healthy people. A significant decrease in the levels of IL-6 and 8 in patients in the main group was noted during treatment with inhaled corticosteroids, which at the end of treatment did not differ from that in the healthy group. Thus, it is possible to fix the balance of the system of pro-inflammatory cytokines.

Table 3

Immunological analysis results

Groups	Fibrinogen	C-reactive protein	IL – 6	IL – 8
1 – group (110)	5,48±1,4	53,3±17,41	135,0±20,81	225,0±20,8
2 – group (50)	4,35±1,5	38,3±10,81	59,1±11,41	63,2±10,5
3 – group (30)	2,57±0,3	2,8±0,5	2,4±0,5	28,4±8,4

The average level of NT-proBNP at the time of inclusion in the study in group 1 was 2755 [1260; 3781], 2 groups - 2593 [978; 3714]. These values do not show significant differences in NT-proBNP levels between the two groups ($p > 0.05$). Patients with an LV EF less than 40% had significantly higher levels of NT-proBNP in the intragroup analysis, which was associated with the severity of CHF ($p<0.05$).

The above data show that patients of both main groups at the initial stage had approximately the same tolerance to physical activity. The results of these functional tests show that CHF symptoms predominated in both groups. No significant statistical differences were found between the groups ($p < 0.05$), although the mean distance was greater in relation to the 6-minute walk test in group 2. Thus, the assessment of the functional class of CHF was carried out on the basis of laboratory parameters obtained from the anamnesis patient, and functional tests that complemented each other and showed similar results. This is a test with a six-minute walk and on the SHOKS scale - an assessment of the clinical condition of a patient with CHF.

During the stages of the study, ExoKG was used to assess the cardiac activity of all patients and determine the central hemodynamics. Comparative analysis of hemodynamics in the study groups showed significant changes in both groups. There was dilatation of the left atrium and left ventricle, an increase in the posterior wall of the left ventricle, an increase in the thickness of the interventricular septum. However, high pressure in the left ventricle and pulmonary artery were in both

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groups of CHF. These changes are associated with the severity of the condition of patients with CHF and COPD. EchoCG results complement previous laboratory and functional examination methods and represent the distribution of patients with chronic heart failure by functional classes, as well as the severity associated with the presence of pulmonary hypertension. Table 5 presents the main echocardiographic parameters of patients in this group.

All patients of the 1st and 2nd groups were determined the level of pro-BNP. High levels of this enzyme were found in the first and second groups and did not differ statistically. The level of pro-BNO in the main group with COPD and CHF and in the second group with CHF was high, which indicates the presence of heart failure in both groups. To solve the problem of CHF with the COPD phenotype, some additions to the standards of diagnosis and treatment are required.

Patients were assessed for NT-proBNP, 6-minute walk test, SHOKS questionnaire, echocardiography and spirometry, EQ-5D-5l and SGRQ performance, and BODE score.

Determining the level of proBNP after 6 months of therapy showed the following results.

Table 4

ProBNP levels after 6 months of therapy

1 – group (110)			
Indicators	**(n=110)**	ФВ>**40% (n=76)**	ФВ<**40% (n=34)**
At the beginning of the checks	**2755 [1260; 3781]**	**1068 [1025-2062]**	**1793 [1010-2358]**
In 6 months	**1564 [1200-3863]**	**1035 [1020-3050]**	**1079 [1018-1140]**
p	$_{1-2}$ >0,05	$_{1-2}$ >0,05	$_{1-2}$ >0,05
2 – group (50)			
Indicators	**(n=50)**	ФВ **>40% (n=28)**	ФВ<**40% (n=22)**
At the beginning of the checks	**2593 [978; 3714]**	**1028 [979-1699]**	**1401 [1065-1789]**
In 6 months	**1239 [978; 1500]**	**1037 [902-1712]**	**1045 [1015-2083]**
p	$_{3-4}$ <0,05	$_{3-4}$ <0,05	$_{3-4}$ <0,05
	$_{2-4}$ <0,05	$_{2-4}$ <0,05	$_{2-4}$ <0,05

When analyzing the obtained results, there were no significant differences in the dynamics of NT-proBNP levels in the main and first control groups. An increase in the NT-proBNP parameter was observed when assessing the main group in patients with CHF> 40% and CHF <40%, but there was no statistical difference. This result does not show significant positive clinical results in a stable CHF clinic. After 6 months in the first control group, i.e. in patients only with CHF, there is a significant positive trend. The significance of differences was also important in assessing this indicator in the group with CHF> 40% (p <0.05), but the mean values of NT-proBNP were approximately the same. A more pronounced decrease in the value of NT-proBNP by 40% was noted in the group with CHF <40%. Therapy with the addition of ARNI in the groups of patients with CHF and with COPD and CHF had a greater effect on patients with a less favorable prognosis.

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ISSN 1477-9315 http://www.jehr-online.org/
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Distribution of groups into subgroups with CHF > 40% and CHF <40%. The dynamics of the condition of such patients is completely different, and the clinical assessment should be carried out with more accurate data. The data presented showed that the mean levels of NT-proBNP in groups 1 and 2 were 2755 pg/ml and 2593 pg/ml, respectively. In patients with CHF <40%, divided into the second group according to CHF criteria, this indicator was 1239 pg/ml after 1564 months of therapy, which radically changed the approach to this category of patients. The dynamics of NT-proBNP levels helps the doctor in choosing the tactics of therapy and especially in evaluating its effectiveness. Details are shown in figures 2 and 3.

The valsartan/sacubitril complex showed better results than ACE inhibitor treatment. Significant laboratory dynamics in the form of a decrease in the level of NT-proBNP was observed in patients with CHF <40%, which affects the pathogenetic mechanisms associated with the formation and development of CHF. The results obtained significantly influenced the increase in exercise tolerance in patients with chronic obstructive pulmonary disease complicated by chronic heart failure. The narrowing of the RA cavity and the decrease in LA pressure indicate not only the regression of COPD, but also the regression of CHF. The use of IF-channel inhibitors in the treatment of patients with obesity and chronic obstructive pulmonary disease complicated by chronic heart failure reduces the broncho-obstructive syndrome in these patients and significantly reduces the number of seizures.

In 75 (80%) patients, blood lipid parameters such as plasma cholesterol, triglycerides, very low density lipoproteins, a significant increase in low density lipoproteins and a decrease in high density lipoproteins were initially impaired.

After six months of treatment, no significant improvement was observed in both groups. A slight decrease in total cholesterol and its atherogenic fractions was shown, which led to a decrease in the atherogenic index by 14.9% and by 17.4% in the first and second groups. The use of statins in the treatment regimen for obese patients with chronic obstructive pulmonary disease complicated by chronic heart failure has a metabolically neutral effect. Blockers of the RAAS neurohormonal system help to improve the lipid profile due to their vasoprotective, antioxidant effects and synergy, which in turn helps to improve vascular permeability and thus reduce the clinical manifestations of heart failure.

The levels of fibrinogen and pro-inflammatory cytokines decreased in both groups after treatment. In addition, the changes were more significant in both groups (Table 5).

In patients with chronic obstructive pulmonary disease complicated by chronic heart failure, cytokine activity was significantly reduced during long-term therapy. Thus, it is possible to fix the balance of the pro-inflammatory cytokine system during COPD remission.

Table 5

Immunological analysis results

Groups	Fibrinogen	C-reactive protein	IL – 6	IL – 8

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ISSN 1477-9315 http://www.jehr-online.org/
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1 – group (110)	4,8±1,4	32,2±15,1	62,0±20,81	48,0±9,2
2 – group (50)	4,2±1,4	15,3±10,81	9,1±1,41	30,2±3,1
3 – group (30)	2,52±0,3	2,8±0,5	8,4±2,5	25,4±8,4

The inclusion of proBNP levels in the standards for diagnosing COPD patients also serves as an effective method for early detection and early treatment of chronic heart failure and preventing its worsening.

SUMMARY

1. Chronic obstructive pulmonary disease in patients with obesity, complicated by chronic heart failure, is characterized by the predominance of pathogenetic mechanisms of endothelial dysfunction, depending on the stage of COPD and the stage of CHF. The more severe COPD, the higher the levels of pro-inflammatory cytokines, which indicate the severity of endothelial dysfunction. Also, the higher the stage of CHF, the higher the level of proBNP

2. The use of an β-receptor blocker in patients with stable CHF is characterized by an improvement in the quality of life based on the SGRQ and EQ-5D-5L questionnaires, as well as SHOKS. The analysis of the effectiveness of therapy with an if-receptor blocker on endothelial function, markers of cytokine inflammation, the level of NUP, and the hemostasis system showed a significant improvement in all parameters in patients with COPD complicated by CHF.

3. When using ARNI, pro-BNP levels can be used not only to assess CHF, but also to predict patients with COPD complicated by CHF, since there is a strong correlation with both parameters of the disease. Pro-BNP levels decreased on long-term ARNI therapy in both groups.

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