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Effect of l-arginine on life quality in patients with hypertensive disease and chronic obstructive pulmonary disease

Luybov Dron and Iryna Kupnovytska

Abstract

The aim: of the research was to improve the effectiveness of pharmacotherapy for patients with hypertensive disease and co-existent chronic obstructive pulmonary disease using an exogenous nitric oxide donor – L-arginine through the correction of structural and functional indices of the heart, pulmonary ventilation and according to patients' life quality.

Materials and Methods: The study included 102 patients with stage II second-degree/third-degree hypertensive disease; among them, there were 82 patients with hypertensive disease and co-existent chronic obstructive pulmonary disease and 20 patients with hypertensive disease (essential hypertension) of a similar stage and degree at the age of 65.5±4.12 years.

According to treatment, 82 patients with hypertensive disease and chronic obstructive pulmonary disease were divided into two homogeneous groups according to age, sex, duration of hypertensive disease and chronic obstructive pulmonary disease. Group I (the control group) included 40 patients undergoing basic therapy only. Group II (the main group) included 42 patients, who, in addition to basic therapy, received L-arginine.

Results and Discussion: There was noted a precipitating effect of chronic obstructive pulmonary disease on the clinical course of hypertensive disease through the worsening of the indicators of the cardiorespiratory system.

In patients with hypertensive disease and co-existent chronic obstructive pulmonary disease, the left ventricle was characterized by an increase in metric and volumetric indices – end-systolic dimension increased by 17.8%, end-systolic volume increased by 44.4% compared to patients with isolated hypertensive disease ($p<0.05$). The size of the left atrium in patients with chronic obstructive pulmonary disease was 42.5±2.13 mm, i.e. it was larger than that in patients with hypertensive disease reflecting left ventricular remodeling and indicating the development of diastolic dysfunction ($p<0.05$). The mean systolic pressure within the pulmonary circulation of patients with hypertensive disease was 19% higher than in healthy persons ($p<0.05$), while in patients with comorbidity, it was 128% higher than that in healthy persons ($p<0.001$).

According to the spirogram, in patients with comorbidity, the forced expiratory volume in one second was 48±1.1% compared to patients with hypertensive disease - 70±2.8% ($p<0.01$) indicating a moderate positive correlation with the indicator of physical functioning ($r= 0.45$; $p<0.05$). Thus, in patients with hypertensive disease and co-existent chronic obstructive pulmonary disease, bronchial patency is significantly impaired thereby increasing systolic pressure within the pulmonary circulation and creating a pathogenic basis for the development of cardiac remodeling as well as resulting in lower quality of life indices including general health, physical functioning, role limitations due to physical health and vitality.

After 3 months of pharmacotherapy with L-arginine, there was observed a number of positive effects on the clinical course of comorbidity involving the cardiovascular and respiratory systems: the decrease in blood pressure within the pulmonary circulation by 54% ($p<0.001$) due to treatment contributed to the increase in ventilation and gas exchange as indicated by increased lung capacity and, especially, increased Tiffeneau index; left ventricular end-systolic volume reduced by 8.6% ($p<0.05$) indicating positive dynamics of left ventricular contractile function.

Generally, under the influence of L-arginine, the indicators of general health improved by 31.6% ($p<0.05$), while in the control group they improved by 17.6% only ($p<0.05$).

Conclusions: The use of L-arginine in combination treatment of patients with hypertensive disease and co-existent chronic obstructive pulmonary disease promotes the potentiation of antihypertensive therapy as well as the improvement of bronchial patency, structural and functional indices of the heart and, therefore, has a positive effect on life quality.

Keywords: hypertensive disease, chronic obstructive pulmonary disease, pulmonary hypertension, l-arginine, life quality

1. Introduction

Chronic obstructive pulmonary disease (COPD) and hypertensive disease (HD) are the most common diseases worldwide. According to the national and international publications, the coexistence of HD and COPD accounts for approximately 34-50% of cases [1, 3]. Moreover, the coexistence of these pathologies results in a number of problems in both cardiology and

pulmonology. According to the Global Initiative for COPD (GOLD) guidelines, the main goal of effective treatment of this disease is to eliminate symptoms and improve exercise tolerance as well as to prevent and treat exacerbations and complications [6, 9]. The adherence to the above-mentioned principles contributes to the improvement of patient's well-being as well as to a significant increase in quality of life (QoL) [2, 10]. The presence of comorbidity, especially hypertension, affects the clinical course and prognosis of COPD in a greater degree than the state of bronchial patency and pulmonary ventilation [5, 8], and QoL may be influenced by both subjective and objective factors including the state of the cardiovascular system [4, 7].

2. The Aim of the Research

The aim of the research was to evaluate and determine cardiovascular factors affecting QoL indices in patients with stage II HD and stages II and III COPD.

2.1. Materials and Methods

The study included 102 patients with stage II first-degree/second-degree HD; 82 of them suffered from HD with co-existent COPD. The comparison group included 20 patients with HD of a similar stage and degree. The average age was 65.5±4.12 years. The duration of HD was 6.2 ± 1.78 years, the duration of COPD was 10.4 ± 2.93 years. All the patients underwent basic therapy for HD according to 2013 Clinical Practice Guidelines for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC), the Order of Ministry of Health of Ukraine of May 24, 2012 No 384 "On Approval and Implementation of Medical and Technical Documents on Standardization of Medical Care in Arterial Hypertension" and treatment of COPD according to "Unified Clinical Protocol of Primary, Secondary (Specialized) and Tertiary (Highly Specialized) Medical Care and Medical Rehabilitation" approved by the Order of Ministry of Health of Ukraine of June 27, 2013 No 555 555 "On Approval and Implementation of Medical and Technical Documents on Standardization of Medical Care in Chronic Obstructive Pulmonary Disease" and the guidelines of the International Congress "Global Strategy for the Diagnosis, Management and Prevention of Chronic Obstructive Pulmonary Disease" (updated 2013).

According to treatment, 82 patients with HD and COPD were divided into two homogeneous groups according to age, sex, duration of HD and COPD. Group I, the control group (CG), included 40 patients receiving basic therapy only: angiotensin-converting enzyme inhibitor Perindopril at a dose of 8 mg a day (Gedeon Richter, Poland); calcium channel blocker Amlodipine at a dose of 5 mg a day (KRKK, Slovenia); diuretic Trifas Cor at a dose of 5 mg a day (Berlin-Chemie, Germany); beta-blocker Nebivolol Sandoz at a dose of 5 mg a day (Sandoz, Switzerland); acetylsalicylic acid Aspirin Cardio at a dose of 100 mg a gay (Bayer AG, Spain/Germany); short-acting bronchial spasmolytic Atrovent Aerosol at a dose of 10 ml (200 doses) (Boehringer Ingelheim, Germany) - 1-2 inhalations, if necessary, according to the above-mentioned protocols. Group II, the main group (MG), included 42 patients receiving in addition to basic therapy intravenous infusion of 4.2% L-arginine hydrochloride infusion solution No 5 (Tivortin, manufactured by Yuria-Pharm, Ukraine) at a dose of 100 ml and continuing taking the medicine using oral dosage form (1 tablespoon 5 times a day) for three months. The examination was performed before and 3 months after treatment. The indicators of studied patients were compared with those in 20 apparently healthy individuals.

All the patients underwent physical examination as well as spirographic examination using the MasterScreen Pneumo spirometer (Jaeger-VIASYS, Germany/USA). The indicators of the forced expiratory volume in one second (FEV_1), the forced vital capacity (FVC) and their ratio (FEV_1/FVC) - the Tiffeneau index were used.

Echocardiography was performed using Logic 500 PRO Ultrasound Machine (Kranzbuhler). Left ventricular (LV) end-systolic dimension (ESD) and end-systolic volume (ESV), as well as LV end-diastolic dimension (EDD) and end-diastolic volume (EDV), the diameter of the right ventricle (RV) were analyzed. To study diastolic function, the indicators of early (E) and late (A) LV filling velocity and the E/A ratio, as well as the deceleration time of early diastolic filling (DecT) and isovolumic relaxation time (IVRT) were analyzed. LV diastolic dysfunction was determined as an inverse E/A ratio (E/A<1), the prolongation of DecT and/or IVRT.

The range of pulmonary artery systolic pressure (PASP) was determined by the peak velocity of transtricuspid regurgitation and the value of systolic transtricuspid pressure gradient when performing ECHO-CG using Logic-500 Doppler (Kranzbuhler) by the formula PASP = ΔP + right atrial pressure (mmHg), where ΔP = 4 VT × 2 (VP - peak velocity of transtricuspid regurgitation measured in m/s $^{-1}$)

Quality of life was assessed using standard adapted questionnaire - the 36-Item Short Form Health Survey (SF-36) that allows assessing the relationships of QoL and social status, mental health and general satisfactory condition of patients to the fullest extent. It consists of 36 items which are grouped into 8 subscales: physical functioning (PF) – it assesses the level of independence in activities of daily living, walking, climbing stairs, carrying heavy loads, and performing significant physical activity; role limitations due to physical health (RP) – it characterizes the degree of limitation in activities of daily living due to physical health problems; bodily pain (BP) – it reflects the intensity of pain and its effect on the ability to engage in normal activities; general health (GH); vitality (VT) – it assesses the patient's feeling of the fullness of energy and strength; social functioning (SF) – it reflects the satisfaction with communication and spending time with friends, family and co-workers; role limitations due to emotional problems (RE) – it assesses the emotional state which interferes with work performance or normal daily activities including vast expenditures of time spent on work or other activities, reduction in the amount of work and decrease in quality of work; mental health (MH) – it characterizes mood, presence of depression, anxiety as well as estimates the total value of positive emotions. Five items (PF, RP, BP, GH, VT) are used to assess the patient's physical state; five items (RE, SF, MH, GH, VT) are also used to score the patient's psychosocial state. The indicators of GH and VT are determined by both physical and mental status. The maximum score of 100 is achieved when no disability is reported. The higher the score in each scale, the better QoL parameter is.

Statistical processing of the obtained results was performed using the statistical software package STATISTICA 6. To compare two independent groups the Student's t-test was used. The Pearson correlation coefficient (r) was used to

determine the strength of relationships between quantitative variables.

3. Results and Discussion

Table 1 presents the results obtained according to SF-36. The indicator of general health status in patients with HD and co-existent COPD was 17.8% lower compared to patients with isolated HD and 41.7% worse than in healthy individuals ($p<0.05$). In patients with co-existent pathology, the indicator of role limitations due to physical health was 20.8% ($p<0.05$) and 52.8% ($p<0.001$) lower, respectively. The indicator of vitality also decreased in patients with co-existent pathology (by 1.2 times compared to patients with HD and 1.7 times compared to healthy persons ($p<0.05$)). Correspondingly, physical functioning reduced as well. At the same time, the indicators of emotionality, social functioning, bodily pain, mental health were not significantly different from each other in both groups of patients; however, they were significantly lower compared to healthy individuals.

The obtained data indicate significant negative changes in physical functioning, vitality and general well-being of patients with HD and co-existent COPD, which may be caused by syndrome of mutual coexistence occurring in simultaneous development and parallel course of both pathologies. It is due to the indicators of central and peripheral hemodynamics being involved in the pathological process.

Table 1: Quality of life indices in patients with HD and co-existent COPD according to questionnaire (SF-36) (expressed as a score on a 0–100 scale) before and 3 months after treatment

Indicators	Healthy individuals, n=20	Patients with HD, n=20		Patients with HD and co-existent COPD, n=40 (CG)		Patients with HD and co-existent COPD, n=42 (MG)	
		before treatment	after treatment	before treatment	after treatment	before treatment	after treatment
	1	2	3	4	5	6	7
PF	95.6±4.11	62.7±4.51 $p_{2-1}<0.001$	69.8±4.14 $p_{3-1}< 0.001$ $p_{3-2}>0.05$	44.6±2.82 $p_{4-1}<0.001$ $P_{4-2}<0.01$	50.3±2.93 $p_{5-3}<0.05$ $p_{5-4}>0.05$	43.6±2.74 $p_{6-1}<<.001$ $p_{6-2}<0.001$	53.6±3.14 $p_{7-6}<0.05$ $p_{7-5}>0.05$
RP	90.7±4.92	52.5±3.12 $p_{2-1}<0.001$	60.8±3.53 $p_{3-1}<0.001$ $p_{3-2}>0.05$	42.8±2.94 $p_{4-1}<0.001$ $p_{4-2}< 0.05$	48.4±2.34 $p_{5-3}<0.01$ $p_{5-4}>0.05$	41.6±2.73 $p_{6-1}<0.001$ $p_{6-2}<0.05$	50.8±2.67 $p_{7-6}<0.05$ $p_{7-5}>0.05$
BP	89.9±4.13	58.3±4.31 $p_{2-1}<0.001$	68.2±3.85 $p_{3-1}<0.001$ $p_{3-2}< 0.05$	56.5±3.11 $p_{4-1}<0.001$ $p_{4-2}>0.05$	60.7±2.94 $p_{5-3}>0.05$ $p_{5-4}>0.05$	54.9±3.23 $p_{6-1}<0.001$ $p_{6-2}<0.05$	64.2±2.56 $p_{7-6}<0.05$ $p_{7-5}<0.05$
GH	79.2±4.12	56.2±3.53 $p_{2-1}<0.001$	61.1±3.14 $p_{3-1}<0.01$ $p_{3-2}>0.05$	46.1±2.93 $p_{4-1}<0.001$ $p_{4-2}< 0.05$	54.2±3.14 $p_{5-3}>0.05$ $p_{5-4}>0.05$	46.2±2.84 $p_{6-1}<0.001$ $p_{6-2}<0.05$	60.8±1.84 $p_{7-6}<0.05$ $p_{7-5}< 0.05$
VT	76.7±3.93	54.4±3.42 $p_{2-1}<0.001$	61.3±3.15 $p_{3-1}<0.01$ $p_{3-2}>0.05$	44.3±2.81 $p_{4-1}<0.001$ $p_{4-2}< 0.05$	52.2±2.83 $p_{5-3}> 0.05$ $p_{5-4}>0.05$	44.7±3.24 $p_{6-1}<0.001$ $p_{6-2}<0.05$	56.1±3.17 $p_{7-6}>0.05$ $p_{7-5}<0.05$
SF	96.2±4.45	68.5±3.22 $p_{2-1}<0.001$	78.1±3.12 $p_{3-1}<0.01$ $p_{3-2}<0.05$	67.1±3.44 $p_{4-1}<0.001$ $p_{4-2}>0.05$	72.1±2.13 $p_{5-3}>0.05$ $p_{5-4}>0.05$	66.3±4.16 $p_{6-1}<0.001$ $p_{6-2}<0.05$	75.1±2.94 $p_{7-6}<0.05$ $p_{7-5}>0.05$
RE	91.3±3.86	57.9±3.94 $p_{2-1}<0.001$	65.5±3.16 $p_{3-1}<0.001$ $p_{3-2}>0.05$	50.4±3.22 $p_{4-1}<0.001$ $p_{4-2}>0.05$	55.2±2.44 $p_{5-3}<0.05$ $p_{5-4}>0.05$	49.4±2.29 $p_{6-1}<0.001$ $p_{6-2},0.05$	58.9±3.44 $p_{7-6}<0.05$ $p_{7-5}>0.05$
MH	78.3±4.3	60.3±4.12 $p_{2-1}<0.001$	68.4±4.23 $p_{3-1}>0.05$ $p_{3-2}>0.05$	56.3±2.74 $p_{4-1}<0.001$ $p_{4-2}>0.05$	64.5±2.76 $p_{5-3}>0.05$ $p_{5-4}<0.05$	54.9±2.84 $p_{6-1}<0.001$ $p_{6-2}<0.05$	63.9±3.37 $p_{7-6}<0.05$ $p_{7-5}>0.05$

Notes:

p_{2-1}, p_{4-1} p_{6-1}, - statistically significant difference between groups of patients and healthy persons before treatment;

p_{4-2} p_{6-2}, - statistically significant difference between groups of patients before treatment;

p_{5-3}, p_{7-5} - statistically significant difference between groups of patients after treatment;

p_{3-2}, p_{5-4} p_{7-6} - statistically significant difference between groups of patients before and after treatment.

Structural and functional indices of the heart were significantly different from each other in all groups of patients (Table 2). In patients with HD and co-existent COPD, the LV was characterized by an increase in metric and volumetric indices – ESD increased by 17.8%, ESV increased by 44.4% compared to patients with isolated HD ($p<0.05$). The size of the left atrium (LA) in COPD and HD was 42.5±2.13 mm, i.e. it was larger than that in patients with HD reflecting LV remodeling and indicating the development of diastolic dysfunction ($p<0.05$). Changes in indices of LV diastolic filling were observed: reduction in the peak early (E) LV filling velocity and increase in the late (A) LV filling velocity; tendency to the inversion of the E/A ratio from 0.91±0.03 in patients with isolated HD to 0.95±0.04 in patients with comorbidity. However, the E/A ratio was not significantly different between groups. In patients with comorbidity, LV DecT was elongated by 7.3% compared to patients with HD – from 205±5.2 ms to 220±4.3 ms ($p<0.05$); IVRT was elongated by 8.4% - from 89.9±2.42 ms to 97.5±1.14 ms ($p<0.05$). In indicates the intensity of the process of diastolic filling which is characterized by both reduction in flow velocity during early diastole and increase in the strength of atrial systole as well as the development of diastolic dysfunction (Table 2).

Table 2: Structural and functional indices of the heart in patients with HD and co-existent COPD before and 3 months after treatment

Indicators	Healthy individuals, n=20	Patients with HD, n=20		Patients with HD and co-existent COPD, n=40 (CG)		Patients with HD and co-existent COPD, n=42 (MG)	
		before treatment	after treatment	before treatment	after treatment	before treatment	after treatment
	1	2	3	4	5	6	7
LV ESV, ml	45.9±2.01	50.6±2.71 p_{2-1}>0.05	49.2±1.8 p_{3-1}>0.05 p_{3-2}>0.05	73.3±3.6 p_{4-1}<0.001 p_{4-2}<0.001	70.2±2.1 p_{5-3}<0.001 p_{5-4}<0.001	74.1±2.6 p_{6-1}<0.001 p_{6-2}<0.01	68.2±1.8 p_{7-6}>0.05 p_{7-5} >0.05
LV EDV, ml	120±5.2	135±3.4 p_{2-1}<0.05	134±3.7 p_{3-1}<0.05 p_{3-2}>0.05	145±3.1 p_{4-1}<0.01 p_{4-2}<0.05	142±2.8 p_{5-3}<0.05 p_{5-4}<0.001	144±3.2 p_{6-1}<0.001 p_{6-2}<0.05	143±3.5 p_{7-6}>0.05 p_{7-5} >0.05
LV ESD, ml	35.9±2.54	37.6±2.1 p_{2-1}>0.05	36.9±2.2 p_{3-1}>0.05 p_{3-2}>0.05	44.3±2.89 p_{4-1}<0.05 p_{4-2}>0.05	40.3±2.11 p_{5-3}>0.05 p_{5-4}>0.05	43.9±2.59 p_{6-1}<0.001 p_{6-2}<0.05	38.9±2.33 p_{7-6}>0.05 p_{7-5} >0.05
LA, mm	37.42±1.31	40.5±2.22 p_{2-1}>0.05	40.1±2.13 p_{3-1}>0.05 p_{3-2}>0.05	43.5±2.13 p_{4-1}<0.05 p_{4-2}>0.05	43.4±1.8 p_{5-3}>0.05 p_{5-4}>0.05	42.7±2.73 p_{6-1}<0.05 p_{6-2}>0.05	40.9±2.13 p_{7-6}>0.05 p_{7-5} >0.05
RV, mm	26.13±1.12	27.2±1.24 p_{2-1}>0.05	26.3±1.4 p_{3-1}>0.05 p_{3-2}>0.05	52.5±2.22 p_{4-1}<0.001 p_{4-2}<0.001	50.7±2.51 p_{5-3}<0.001 p_{5-4}<0.001	53.2±1.42 p_{6-1}<0.001 p_{6-2}<0.001	49.8±1.32 p_{7-6}<0.05 p_{7-5} >0.05
LV E/A	1.2±0.22	0.91±0.03 p_{2-1}<0.01	0.93±0.02 p_{3-1}>0.05 p_{3-2}>0.05	0.95±0.04 p_{4-1}>0.05 p_{4-2}>0.05	0.96±0.01 p_{5-4}>0.05 p_{5-3}>0.05	0.94±0.03 p_{6-1}>0.05 p_{6-2}>0.05	0.94±0.01 p_{7-6}>0.05 p_{7-5}>0.05
LV IVRT, ms	81.0±2.9	89.9±4.4 p_{2-1}<0.05	87.8±3.2 p_{3-2}>0.05 p_{3-1}>0.05	97.5±5.1 p_{4-1}<0.001 p_{4-2}<0.001	94.5±6.2 p_{5-3}<0.05 p_{5-4}>0.05	98.1±4.2 p_{6-1}<0.001 p_{6-2}<0.05	94.8±5.8 p_{7-6}>0.05 p_{7-5}>0.05
LV DecT, ms	173.5±2.3	205±10.2 p_{2-1}<0.001	201±9.8 p_{3-2}>0.05 p_{3-1}<0.001	217±10.4 p_{4-1}<0.001 p_{4-2}<0.05	215±8.9 p_{5-3}<0.05 p_{5-4}>0.05	216±10.8 p_{6-1}<0.001 p_{6-2}<0.05	214±9.3 p_{7-6}>0.05 p_{7-5}>0.05
Mean PA pressure, mmHg	21±0.9	25±1.3 p_{2-1}<0.05	25±0.8 p_{3-2}>0.05 p_{3-1}<0.01	48±2.6 p_{4-1}<0.001 p_{4-2}<0.001	45±2.1 p_{5-3}<0.001 p_{5-4}>0.05	48±3.2 p_{6-1}<0.001 p_{6-2}<0.001	31±1.8، p_{7-6}<0.05 p_{7-5}<0.05

Notes

p_{2-1}, p_{4-1} p_{6-1}, - statistically significant difference between groups of patients and healthy persons before treatment;
p_{4-2} p_{6-2}, - statistically significant difference between groups of patients before treatment;
p_{5-3}, p_{7-5} - statistically significant difference between groups of patients after treatment;
p_{3-2}, p_{5-4} p_{7-6} - statistically significant difference between groups of patients before and after treatment.

There were changes in right ventricular structure and function: right ventricular transverse dimension was 52.5±2.22 mm in patients with comorbidity and 27.2±1.10 mm in patients with HD being significantly larger than that in healthy persons ($p<0.05$). The mean systolic pressure within the pulmonary circulation of patients with HD was 19% higher than that in healthy individuals ($p<0.05$), while in patients with comorbidity, it was 128% higher than that in healthy individuals ($p<0.001$).

The correlation analysis has revealed a correlation between the indicator of general health and LV ESV ($r= -0.59$; $p<0.05$), LV EDV ($r= -0.63$; $p<0.05$). The indicator of physical functioning decreased, while RV diameter increased ($r= -0.43$; $p<0.05$). There was an inverse dependence between the indicator of role limitations due to physical health and RV diameter ($r= -0.47$; ($p<0.05$).

According to the spirogram, in patients with comorbidity, the forced expiratory volume in one second was 48±1.1% as compared to patients with HD - 70±2.8% ($p<0.01$) indicating a moderate positive correlation with the indicator of physical functioning ($r= 0.45$; $p<0.05$). Thus, in patients with HD and co-existent COPD, bronchial patency is significantly impaired thereby increasing systolic pressure within the pulmonary circulation and creating a pathogenic basis for the development of cardiac remodeling as well as resulting in lower quality of life indices including general health, physical functioning, role limitations due to physical health and vitality. The correlation between SF-36 items and parameters of the respiratory and cardiovascular systems indicates a significant role of mutual coexistence in reducing QoL in patients with hypertension in both the pulmonary and systemic circulations.

Pharmacotherapy using an exogenous nitric oxide donor and universal vasodilator being performed for both diseases allowed us to conclude that the condition of patients receiving L-arginine was significantly different from the control group. Thus, QoL indices improved significantly 3 months after treatment with L-arginine (Table 1). The indicator of physical functioning increased by 23% ($p<0.05$), the indicator of vitality increased by 25.5%, while the indicator of general health was significantly lower than in patients of the CG. Generally, under the influence of L-arginine, the indicators of general health improved by 31.6% ($p<0.05$), while in the CG, they improved by 17.6% only ($p<0.05$).

The decrease in BP within the pulmonary circulation by 54% ($p<0.001$) due to treatment contributed to the increase in ventilation and gas exchange as indicated by increased lung capacity and, especially, increased Tiffeneau index which reached 66±2.3%

3 month after treatment ($p<0.001$).

When determining the degree of correlation between the Tiffeneau index and systolic pressure within the pulmonary circulation, a statistically significant negative correlation was detected ($r =- 0.70$; $p<0.05$). There was a statistically

significant positive correlation between the Tiffeneau index and the indicator of general health ($r = 0.67$; $p<0.05$).

3 months after basic therapy with L-arginine, LV ESV reduced by 8.6% ($p<0.05$) indicating positive dynamics of LV contractile function.

Thus, therapy using L-arginine as an exogenous nitric oxide donor and universal vasodilator had a positive influence on QoL in patients with HD and co-existent COPD, as well as on the state of the cardiovascular system in general.

4. Conclusions

1. Arterial hypertension in patients with COPD which results in the syndrome of mutual coexistence reduces vitality and general well-being of patients.
2. According to the questionnaire, the main changes in life quality in patients with HD and co-existent COPD belong to the physical component of life. Structural and functional changes in the cardiovascular system are considered as the most probable factors affecting them.
3. The use of L-arginine in combination treatment of patients with HD and co-existent COPD for 3 months reduces the severity of pulmonary hypertension and RV dimension, as well as positively affects the indicators of bronchial patency and improves life quality in patients.

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