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Evaluation of Clinical and Functional Disorders in Patients with Chronic Obstructive Diseases of the Lungs and Bronchial Asthma

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Abstract--

Aim: *The aim of this investigation was to study the characteristics of functional disorders in patients with chronic obstructive pulmonary disease and bronchial asthma from the severity of clinical course of the disease.*

Material and methods:*118 patients with chronic obstructive pulmonary disease and 114patients with bronchial asthma (BA) were selected for clinical – functional examinations of in - patient department. Assessment of the functional of external respiration (FER) was carried out by the method of computer pneumotachometry on the apparatus «Pneumoscope» (Erich Jaeger, Germany).The discriminant equation was used for the diagnostics of tiredness of the diaphragm and respiratory muscles: DF = 17,3 x IVF 50 (l/s) where F is discriminant function. In F <65,1 f tiredness of the diagram was diagnosed (Yu. M. Perelman with coauth., 1998). Or evaluation of oxigyn - transportic system of blood and the parameters of the acid - alkaline balance of weights: In patients with COPD and BA included in the study by using the Astrup micro method, oxygen tension (pO2 mmHg), carbon dioxide voltage (pCO2 mmHg), blood oxygen saturation (O2, %) were studied in arterialized blood.The stage of the autonomous nervous system was assessed by cardiointervalography (CIG) according to Baevsky (1976).* ***Result:****Analysis of the clinical course (SRF) showed that the severity of disease is noted not only increased in intensity of clinical manifestations of the disease, but also with an aggravation of degree of cardio-respiratory disorders. There is a high incidence of respiratory muscle fatigue syndrome, sharp degree of severity (96.3%), and infraction of heart rhythm (76.6%) hypoxemia of right part (36.2%) and presence of P-pulmonale (55.3%), varying degrees of hypoxemic (75.0%), including expressed and abrupt till 25% and with hypersymptonic reactions (62.5%), defining the breakdowns of adaptive mechanism. A heavy persistent of BA is characterized with clear intensive clinical symptoms, with significant violation of bronchial patency, with high frequency of syndrome fatigues of respiratory muscles (82.3%), with hypoxemic condition (59.2%), violations of excitability of heart muscles (46.3%), tensions of adaptive-compensatory mechanisms, manifesting of hypersympathicotony (50.0%) and hypersympathicotonic (57.7%) and asympathicotonic vegetative reactivity (19.2%).*

Keywords--*Chronic obstructive pulmonary disease, вronchial asthma, functional of external respiration, of respiratory muscle fatigue syndrome, electrocardiographic changes, chronic respiratory failure, vegetative nervous system.*

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I. INTRODUCTION

The medical significance of chronic obstructive pulmonary disease (COPD) is extremely high, primarily because of its prevalence in the structure of morbidity, they are considered as leading reasons by the number of days of disablement, disability and mortality (5,6,9,10,11,12)**.**According to WHO forecasts, by 2025,COPD will occupy the third place in the world among the causes of high mortality (EPO,2001).Moreover, over the last of the XX the century, the mortality in COPD has increased to 28%(2,3).

Chronic obstructive pulmonary disease (COPD)and bronchial asthma (BA). is one of the leading causes of morbidity and mortality all over the world, which poses a significant and ever –increasing economic and social problem (1,3,4,5)**.**

In Uzbekistan respiratory diseases take the first place by their prevalence. Over the past 5 years the index of morbidity has increased in 2,5 times. The frequency of temporary disablement and disability from COPD has been increasing in the republic annually. Mortality from this pathology is 1,5 – 2 times higher than the corresponding indexes in Russia (9).According to official statistics, the number of patients with chronic non- specific lung diseases was 3,5 times higher than the number of patients with the diseases of cardiovascular system in 2001 in Uzbekistan.

COPD is characterized by a steady progression of bronchial obstruction, which leads to the gradual loss of the reversible component, an increase of the systems of disease and a decrease of the quality of life (QoL)of the patients(6).

Recently, a number of scientific works have appeared in the literature confirming the path - genetic significance and the role of the functional state, in particular, the tension of the autonomic nervous system in various diseases. Currently, the interest of clinicians has significantly increased to the study of functional state of the autonomic nervous system (ANS).The ANS mediates its effect on the functional state of bronchi through the sympathetic and parasympathetic mechanisms of regulation. The effects are transmitted by vagus nerve that causes contraction of smooth muscle of the bronchi; through the pulmonary sympathetic plexuses – adrenergic effects, relaxing smooth muscles(10).

Chronic respiratory insufficiency (CRI) is one of the most frequent and serious complications of bronchial asthma (BA).

Thus, COPD is not only a medical but also a social - economic and general humanitarian problem (6).

At the same time, the relationship between the subjective feeling of the patient and objective data characterizing the severity of the disease and the autonomic nervous system of chronic obstructive pulmonary disease and bronchial asthma was not well studied.

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II. OBJECTIVES

The aim of this investigation was to study the characteristics of functional disorders in patients with chronic obstructive pulmonary disease and bronchial asthma from the severity of clinical course of the disease.

III. MATERIAL AND METHODS

118 patients with COPD and 114patints with BA were selected for clinical – functional examinations of in-patient department. Of them men – 86 (72,8%)and women – 32 (27,1%) patients. In patients with BA, men made up 61(54,4%)and women53(47,3%).The duration of the disease in patients with COPD and BA was12,9 ± 0,64 and 7,5 ± 0,47 years while inclusion to the study. The duration of COPD and BA up to 5 years was observed in 21.4% and 46,8% of patients, respectively from 5 to 14 years – 42,8% and 34,2%;from 15 to 24 years – 22,8% and 14,2 %; over than 24 years – 13,5 and 14,2%.

Assessment of the functional of external respiration (FER)was carried out by the method of computer pneumotachometry on the apparatus «Pneumoscope» (Erich Jaeger, Germany).Indexes of the function of external respiration (FER)- forced expiratory volume in 1 second (FEV 1),forced vital capacity of the lungs (FVCL),instantaneous volumetric flow in inhalation of 25, 50 and 75% FVCL(IVF25,IVF50,IVF75),expressed in percentage of due magnitudes, peak expiratory speed,the ratio of FEV1 to FVCL (Tiffno test) was studied in 115 patients with COPD.

The discriminant equation was used for the diagnostics of tiredness of the diaphragm and respiratory muscles: DF = 17,3 x IVF 50 (l/s) where F is discriminant function,IVF 50 is the maximum volumetric forced expiratory flow at the level of 50% VCL. In F <65,1 f tiredness of the diagram was diagnosed (Yu. M. Perelman with coauth.,1998).

Or evaluation of oxigyn - transportic system of blood and the parameters of the acid - alkaline balance of weights:pH of the blood, buffer bases (BB, mol /l),shift of buffer bases(BB),standard bicarbonate (SB)were used for the assessment of the oxygen - transport system of the blood and acid and alkaline balance indexes. In patients with COPD and BA included in the study by using the Astrup micro method, oxygen tension (pO2 mmHg),carbon dioxide voltage (pCO2mmHg),blood oxygen saturation (O2,%) were studied in arterialized blood.

The stage of the autonomous nervous system was assessed by cardiointervalography (CIG) according to Baevsky (1976).The main analyzed parameters of the cardiointervalgram were: IVT – initial vegetative tone, VR-vegetative reactivity (R.K.Azimov with coauth.,2000).

IV. RESULTS AND DISCUSSION

The results of our study demonstrated that in patients with COPD with an aggravation of the clinical course severity, at the same time, the intensity of clinical symptoms increases, which is reflected in a considerable augmentation of their **specifically instituted score (Table 1).**

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Table 1 Clinical characteristics of COPD severity symptoms, score

COPD severity degree	Symptoms				
	coughing	sputum	Dyspnea	weakness	sweating
II, n=38	2,12±0,05	2,01±0,05	2,18±0,05	2,20±0,07	1,70±0,07
III, n=27	2,52±0,05	2,47±0,05	2,63±0,05	2,57±0,10	2,03±0,10
IV, n=50	2,67±0,03	2,64±0,03	2,90±0,03	2,85±0,03	2,20±0,06
p1-2	<0,001	<0,001	<0,001	<0,01	<0,02
p1-3	<0,001	<0,001	<0,001	<0,001	<0,001
p2-3	<0,01	<0,01	<0,001	<0,01	<0,05

A progression of COPD severity is characterized by severe cardiorespiratory disorders. As can be seen from table 2, with an exacerbation of the clinical course, the severity of obstructive-restrictive disorders aggrandized, both the frequency and severity of the respiratory muscle fatigue syndrome extremely increased.

Table 2 The severity of ventilation disorders in patients with COPD

COPD severity degree	FEV 1	Vital capacity	Tiffeneau test
II, n=38	61,2±7,6	71,8±6,9	68,1±7,2
III, n=27	40,6±9,6	52,1±9,8	65,2±9,3
IV, n=50	30,6±6,5	47,2±7,1	55,9±7,0
p1-2	<0,05	<0,05	>0,5
p1-3	<0,01	<0,01	<0,2
p2-3	>0,2	>0,5	>0,2

96,3% of patients were diagnosed with a high degree of respiratory muscle fatigue syndrome (RMFS) with an index of less than 21,6 of diagnostically significant level in patients with COPD resulted in severe deterioration of the bronchial obstruction with FEV1 indices of less than 30% of the expected value. 23,2 % of patients with COPD associated moderate obstructive disorders had a high degree of RMFS (Table 3).

Table 3 Distribution of patients with COPD depending on the severity of RMFS, abs. (%)

FEV1 degree, %	n	Degree of RMFS severity		
		mild (65,1 – 43,4)	moderate 43,4 – 21,6	Severe <21,6
≥50<80	43	3 (7,0±3,9)	30 (69,8±7,0)	10 (23,2±6,4)
>30<50	45	-	5 (11,1±4,7)	40 (88,9±4,7)
<30	27	-	1 (3,7±3,6)	26 (96,3±3,6)
p1-2		-	<0,001	<0,001
p1-3		-	<0,001	<0,001
p2-3		-	>0,2	>0,2

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It was determined that with an exacerbation of COPD severity (from II to IV), cardiac arrhythmias 1,6 times (from 47,3 ± 8,4 to 76,6 ± 6,2%, p <0,01), right axis deviation 3,8 times (from 10,5 ± 5,4 to 28,0 ± 7,6%, p <0,05), P-pulmonale 10 times (from 5,5 ± 3,8 to 55,3 ± 7,2%, p <0,001) and right ventricular hypertrophy (S-type) 4,4 times more often (from 8,3 ± 4,6 to 36,2 ± 7,0%, p <0,001) were revealed.

Table 4 Electrocardiographic changes depending on the severity of COPD patients, abs. (%)

Severity degree	**Heart rhythm disturbances**	**Right axis deviation**	**Left axis deviation**	**P-pulmo-nale**	**RV hypertrophy S-type**	**RV hyper-trophy R-type**	**RBBB (in-complete.)**	**LV hypr-trophy**	**Intramyo-cardial dystrophic changes**
II st., n=38	18 (47,3±8,4)	4 (10,5±5,4)	9 (25,0±7,2)	2 (5,5±3,8)	3 (8,3±4,6)	-	5 (13,9±5,8)	5 (13,9±5,8)	34 (94,4±3,8)
III st., n=27	17 (62,9±9,7)	7 (25,9±9,2)	3 (15,8±8,4)	2 (10,5±7,0)	3 (15,8±8,4)	-	1 (5,3±5,1)	3 (15,8±8,4)	15 (78,9±9,4)
IV st. n=50	36 (76,6±6,2)	14 (28,0±7,6)	2 (4,2±2,9)	26 (55,3±7,2)	17 (36,2±7,0)	-	5 (10,6±4,5)	5 (10,6±4,5)	39 (83,0±5,5)
p1-2	<0,2	>0,2	>0,2	>0,5	>0,2	-	>0,2	>0,5	<0,2
p1-3	<0,01	<0,05	<0,05	<0,001	<0,001	-	>0,5	>0,5	<0,05
p2-3	>0,5	>0,2	<0,2	<0,001	<0,05	-	>0,2	>0,5	>0,5

Depending on the severity degree, the evaluation of PaO2 level in patients with COPD facilitates to diagnose chronic respiratory failure (CRF) (Table 5). As study results showed, grade II COPD patients 1,6 times less likely appeared to be diagnosed with type I chronic respiratory failure (CRF) and a level of hypoxemia from 60 to 79 mm. Hg. 26,0% patients of the grade 4 COPD were not diagnosed with CRF, and the level of PaO2 exceeded 80 mm. Hg. I degree of CRF was revealed in 26,0% of patients, II degree of CRF (PaO_2 from 60 to 79 mm Hg) - in 46,0%, III degree of CRF (PaO_2 from 40 to 59 mm. Hg.) - in 18,0% and IV degree of CRF (PaO_2 less than 40 mm. Hg.) - in 10,0%.

Table 5 The level of hypoxemia depending on the severity of COPD

Severity degree	**PaO_2, mmHg**			
	≥80	**≥60<79**	**≥40<59**	**<40**

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II, n=38	21 (55,2±8,4)	12 (31,5±7,8)	5 (13,1±4,4)	-
III, n=27	8 (29,6±10,5)	13 (48,1±11,4)	4 (14,8±8,2)	2 (7,4±5,0)
IV, n=50	13 (26,0±6,8)	23 (46,0±7,9)	9 (18,0±5,6)	5 (10,0±4,7)
p1-2	<0,05	<0,2	>0,5	<0,001
p1-3	<0,01	<0,1	>0,5	<0,001
p2-3	>0,5	>0,5	-	<0,5

An assessment of the adaptive capacity of the body in patients with COPD by the parameters of the initial vegetative tone showed that the vast majority of patients with COPD have an overstrain of adaptive capabilities and the frequency of hypersympathicotonia is 55.4%, sympathicotonia - 16.9%, vagotonia - 7.14% and the frequency of normal adaptive opportunities (ejtonia) is 20.5% (Figure 1).

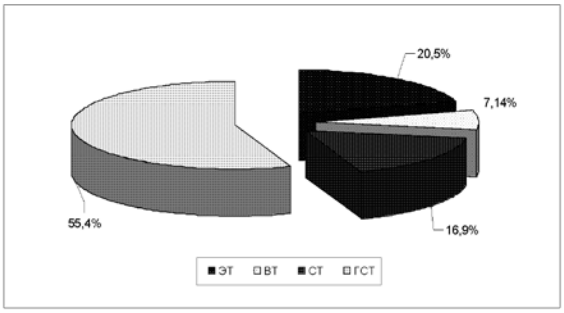

Figure 1. The state of the initial vegetative tone in patients with COPD. or

State baseline autonomic tone in patients with COPD.

With an increase in the degree of COPD, the vegetative balance of patients is characterized by a shift towards the predominance of activity of the sympathetic link of the nervous system, centralization of control processes and a breakdown of the adaptive-adaptive mechanism (table 6). In patients with grade 4 COPD, the number of vagotonics increased by 1.6.

Table 6 Characteristics of initial autonomic tone in COPD patients according to the severitytimes (from 5.3 ± 3.6 to 8.3 ± 4.0%) and hypersympathicotonics increased 1.3 times (from 50.0 ± 8.1 to 62.5 ± 7.0%, p <0.5).

Degree of severity	**ET**	**VT**	**ST**	**HST**
II-degree n=38	5 13,1±5,5	2 5,3±3,6	12 31,6±7,5	19 50,0±8,1
III-degree n=26	4 15,4±7,2	2 7,7±5,2	4 15,4±7,2	16 61,5±9,5
IV-degree n=48	6 12,5±4,8	4 8,3±4,0	8 16,7±5,4	30 62,5±7,0
P1-2	>0,5	>0,5	<0,2	<0,5
P1-3	>0,5	>0,5	<0,1	<0,5
P2-3	>0,5	>0,5	>0,5	>0,5

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In patients with COPD, not only violations of adaptive capabilities, but also changes in the compensatory reactions of the body were noted.

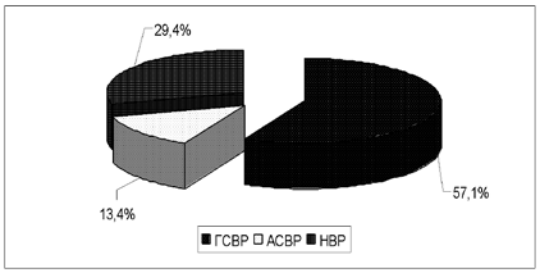

Figure 2. The state of autonomic reactivity in patients with COPD.

When evaluating the compensatory possibilities in 64 (57.1%) patients with COPD, hypersympathicotonic and in 15 (13.4%) asymptaticotonic autonomic reactivity were detected and normotonic autonomic reactivity was noted only in 33 (29.4%) patients (Figure 2).

With an increase in the degree of COPD in patients with hypersympathicotonic and asympathicotonic autonomic reactivity (table 7).

Table 7 Characteristics of autonomic reactivity in patients with COPD depending on severity

Degree of severity	**NVR**	**HSTVR**	**ASTVR**
II-degree n=38	16 42,1±8,0	17 44,7±8,1	5 13,1±5,5
III-degree n=26	6 23,1±8,4	16 61,5±9,7	4 15,4±7,2
IV-degree n=48	9 18,7±5,6	30 62,5±7,0	9 18,7±5,6
P1-2	<0,05	<0,2	>0,5
P1-3	<0,02	<0,1	<0,5
P2-3	>0,5	>0,5	>0,5

Estimating the quality of life parameters for patients with COPD depending on the severity of the disease and the individual parameters for its determination, a significant dependence of their decrease was noted.

Assessment of the clinical symptoms of AD revealed a pronounced dependence of the increase in the intensity of the main symptoms with the aggravation of the stage of the disease (Table 8). In severe persistent asthma, the intensity of asthma attacks is 1.6 times, paroxysmal cough is 1.4 times, cough with sputum that is difficult to separate is 2.7 times higher compared with patients with mild persistent asthma.

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Table 8 The characteristic of clinical symptoms of AD depending on the severity level (in points)

Degree of severity	**Asthma attack**	**Paroxysmal cough**	**Cough with difficult, detachable phlegm**	**Dyspnea**	**Asthenia**	**Sweating**
II-degree n=30	1,77±0,07	1,83±0,09	1,0±0	1,68±0,09	1,68±0,09	1,0±0
III-degree n=31	2,47±0,04	2,33±0,09	2,29±0,09	2,35±0,07	2,07±0,09	1,82±0,09
IV-degree n=53	2,84±0,03	2,57±0,05	2,65±0,03	2,76±0,03	2,68±0,03	1,84±0,06
P1-2	<0,001	<0,001	<0,001	<0,001	<0,01	<0,001
P1-3	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001
P2-3	<0,001	<0,02	<0,001	<0,001	<0,01	>0,5

The clinical symptomatology in AD patients is also confirmed by the nature of ventilation disorders, which, with an increase in the severity of the stage, change their character from obstructive indicators with FEV1, to 69.7 ± 8.2% and VC 79.9 ± 7.2% to obstructively - respiratory disorders with more a marked decrease in both FEV1 and VCI indicators (Table 9).

Table 9 Characteristics of the severity of ventilation disorders in patients with AD

Degree of severity	**FEV 1**	**Vital capacity**	**Tiffeneau test**
II-degree n=30	92,6±4,8	91,5±5,1	90,1±5,4
III-degree n=31	69,7±8,2	79,9±7,2	80,9±7,1
IV-degree n=52	55,6±6,9	69,7±6,4	75,1±6,0
P1-2	<0,05	<0,2	>0,2
P1-3	<0,001	<0,01	<0,05
P2-3	<0,2	>0,2	>0,5

Respiratory muscle fatigue syndrome in AD patients was diagnosed in 82.3% of patients. Comparing the severity of obstructive disorders with the severity of the syndrome of fatigue of respiratory muscles, we noted that with an increase in the degree of obstruction, the incidence of a significant degree of SURM and a 23.8-fold sharp increase in the degree of SURM increases 1.5 times (Table 10).

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Table 10 Characteristics of the degree of obstructive disorders with the severity of the syndrome of fatigue of respiratory muscles in patients with AD

FEV1 degree, %	**Degree of RMFS severity**		
	mild (65,1 – 43,4)	**moderate (43,4 – 21,6)**	**Severe (< 21,6)**
≥ 80 n=40	29 72,5±7,0	10 25,0±6,8	1 2,5±2,5
= 60 - 80 n=36	5 13,9±5,8	28 77,8±6,9	3 8,3±4,6
≤ 60 n=37	1 2,7±2,6	14 37,8±7,9	22 59,5±8,0
P1-2	<0,001	<0,001	>0,2
P1-3	<0,001	>0,2	<0,001
P2-3	<0,05	<0,001	<0,001

Absolute values in the numerator, percent in the denominator

Evaluation of the PaO2 index, which reflects a different degree of chronic respiratory failure, showed that with an increase in the stage of the disease, the number of patients without manifestations of respiratory failure decreases by 1.3 times and the number of patients with II degree DN with RaO2 from 40 to 59 mm increases the column of mercury (tab. 11).

Table 11 Violations of PaO2 parameters in patients with AD depending on the severity

Degree of severity	**PaO_2, mmHg**			
	≥ 80	**≥ 60 < 79**	**≥ 40 < 59**	**< 40**
II-degree n=29	15 51,7±9,4	13 44,8±9,4	1 3,4±3,4	—
III-degree n=30	13 43,3±9,0	16 53,3±9,1	1 3,3±3,3	—
IV-degree n=49	20 40,8±7,0	22 44,9±9,2	7 14,3±5,0	—
P1-2	>0,5	>0,5	>0,5	—
P1-3	<0,5	>0,5	<0,1	—
P2-3	>0,5	>0,5	<0,1	—

Absolute values in the numerator, percent in the denominator

In patients with AD with an increase in severity, changes in the cardiovascular system are also detected. So, in patients with asthma of a severe persistent course, the number of persons with excitability disorders is 2 times higher (46.3 ± 7.8% versus 22.7 ± 9.1% in people with AD of a mild persistent course) and 1.3 times - conduction disturbance (12.2 ± 5.1 versus 9.1 ± 6.3%), deviation from the right is diagnosed 2.2 times more often (9.7 ± 4.6% against 4.5 ± 4.5%), P-pulmonale is noted 4.3 times more often (19.5 ± 6.2% versus 4.5 ± 4.5%). These disorders are more pronounced depending on the degree of chronic respiratory failure and significantly higher in patients with II degree CDI (Fig. 3).

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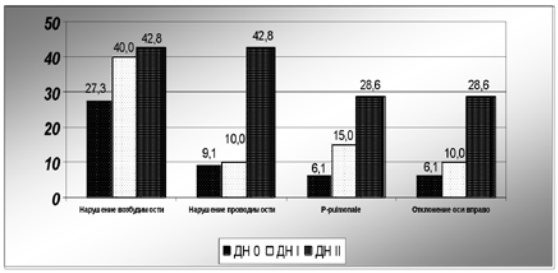

Figure 3. Characterization of electrocardiographic changes in AD patients, depending on the degree of respiratory failure.

The chronic course of the disease leads to a change in the adaptive-compensatory capabilities of the body.

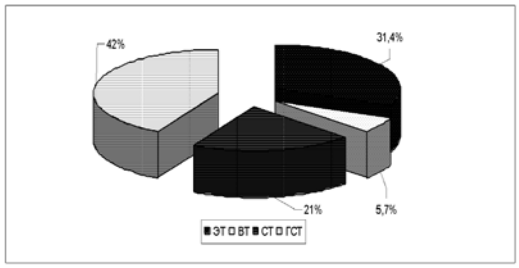

Figure 4. The state of vegetative tone in patients with AD.

Evaluation of the initial vegetative tone, which determines the adaptive capacity of the body, showed that 42% of AD patients have an adaptive capacity strain characterized by hypersympathicotonia, 21% have a state of sympathicotonia, 5.7% have vagotonia and 31.3% have a state of eutonia, which determines preservation of adaptive capabilities (Fig. 4).

Table 12. Severity of asthma with different initial vegetative tone

Degrees of severity	ET	VT	ST	HST
II-degrees n=24	14 58,3±10,0	2 8,3±5,6	3 12,5±6,7	5 20,8±8,3
III-degrees n=29	8 27,6±8,3	3 10,3±5,6	5 17,2±7,0	13 44,8±9,2
IV-degrees n=52	11 21,1±5,6	1 1,9±1,9	14 26,9±6,1	26 50,0±6,9
P1-2	<0,02	>0,5	>0,5	<0,05
P1-3	<0,01	>0,2	<0,2	<0,01
P2-3	>0,5	<0,2	>0,2	>0,5

The results of the study noted that with the aggravation of the clinical course of the disease, the proportion of patients with overstrain of the adaptive capabilities of the body increases from 2.4 times (from 20.8 ± 8.5% to 50.0 ± 6.9%) and 2.8 times the number of persons with equal adaptive capabilities is reduced (from 58.3 ± 10.0 to 21.1 ± 5.6%) (Table 12).

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The worsening of the clinical condition of a patient with AD leads to a violation of the compensatory capabilities of the body, assessed by the state of autonomic reactivity (Table 13).

Table 13. The severity of vegetative reactivity versus severity in patients with AD

Degree of severity	NVR	HSTVR	ASTVR
II-degree n=24	12 50,0±10,4	10 41,6±10,3	2 8,3±5,6
III-degree n=29	12 41,4±9,1	12 41,4±9,1	5 17,2±7,0
IV-degree n=52	12 23,1±5,8	30 57,7±6,8	10 19,2±5,4
P1-2	>0,5	>0,2	<0,5
P1-3	<0,05	<0,2	<0,2
P2-3	<0,1	<0,1	>0,5

From table 4.20 it can be seen that with the aggravation of the stage of the disease, the proportion of patients with preserved compensatory capabilities decreases by 2.2 times (from 50.0 ± 10.4% to 23.1 ± 5.8%), the number of patients with a breakdown in compensatory capabilities increases 1.4 times the number of people with hypersympathicotonic autonomic reactivity (from 41.6 ± 10.3% to 57.7 ± 6.8%) and 2.3 times the number of people with hypersympathicotonic autonomic reactivity (from 8.3 ± 5, 6% to 19.2 ± 5.4%).

V. FINDINGS

Analysis of the clinical course (SRF) showed that the severity of disease is noted not only increased in intensity of clinical manifestations of the disease, but also with an aggravation of degree of cardio-respiratory disorders. There is a high incidence of respiratory muscle fatigue syndrome, sharp degree of severity (96.3%), and infraction of heart rhythm (76.6%) hypoxemia of right part (36.2%) and presence of P-pulmonale (55.3%), varying degrees of hypoxemic (75.0%), including expressed and abrupt till 25% and with hypersymptonic reactions (62.5%), defining the breakdowns of adaptive mechanism.

A heavy persistent of BA (Bronchial Asthma) is characterized with clear intensive clinical symptoms, with significant violation of bronchial patency, with high frequency of syndrome fatigues of respiratory muscles (82.3%), with hypoxemic condition (59.2%), violations of excitability of heart muscles (46.3%), tensions of adaptive-compensatory mechanisms, manifesting of hypersympathicotony (50.0%) and hypersympathicotonic (57.7%) and asympathicotonic vegetative reactivity (19.2%).

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