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Clinico-Functional Features of Concomitant Chronic Bronchitis and Chronic Obstructive Pulmonary Disease and Metabolic Syndrome in the Yakut Ethnic Group

ABSTRACT

Objective. Studing of clinical and functional characteristics of the combined course of chronic bronchitis (CB) and chronic obstructive pulmonary disease (COPD) and metabolic syndrome (MS) in Yakut ethnic group.

Materials and methods. We have examined 88 patients Yakut with chronic bronchitis and COPD in combination with MS. The median age was 50,9 ± 0,91 years. The comparison group consisted of 60 patients Yakut with chronic bronchitis and COPD without metabolic syndrome, where the average age was equal to 48.9 ± 1.35 years. Peculiarities of clinical manifestations and indicators of bronchial patency were also studied.

Results. In the combined course of CB/COPD and MS in Yakut ethnic group, we found more severe clinical manifestations in comparison with the group without metabolic syndrome, in the form of a more severe cough syndrome, more severe dyspnea, sputum gain and changes its character, increasing the frequency of exacerbations. In the combined course of chronic bronchitis and chronic obstructive pulmonary disease and metabolic syndrome in Yakut ethnic group, we found that lung function compared with isolated over these diseases were not significantly different. However, in the combined courses more pronounced disorders of respiratory function in the form of reduced forced vital capacity (FVC), decline in forced expiratory volume in one second FEV_1, FEV_1/FVC ratio increase > 70% were observed in our research.

Conclusion. Combined course of CB/COPD and MS is characterized by more severe changes in the clinical manifestations. Our findings indicate the presence of more pronounced changes in respiratory function in patients with associated course of CB/COPD and MS.

Keywords: metabolic syndrome, chronic bronchitis, COPD, respiratory function.

INTRODUCTION

Respiratory diseases in the Republic of Sakha (Yakutia) occupy one of the leading places in the structure of morbidity and determine largely the level of temporary disability, disability and mortality.

According to WHO, chronic obstructive pulmonary disease (COPD) is one of the most common diseases, it is expected to become the third leading cause of death in 2020. During the

last decade, the concept of COPD has been recognized as a disease with systemic manifestations, which include cardiovascular disease, cachexia, muscle dysfunction, osteoporosis, anemia, clinical depression, metabolic and endothelial dysfunction [7].

Currently, WHO experts consider metabolic syndrome (MS) as "pandemic of the XXI century". Its prevalence in the adult population of Russia according to All-Russian Scientific Society of Cardiologist in 2009 is 20-40 % and more frequently, it occurs in middle-aged and older. The prevalence of MS according to the International Diabetes Federation among the aboriginal population of Yakutia is 8.8 % [1].

Today, however, the combined features of chronic bronchitis and COPD with MS in domestic science devoted to the study unit and the available literature, we found no data on the combination of chronic bronchitis and COPD with MS Yakut ethnic group.

The aim of this study was to investigate the clinical and functional characteristics of the combined course of chronic bronchitis and chronic obstructive pulmonary disease and metabolic syndrome in Yakut ethnic group.

MATERIALS AND METHODS

We conducted a comprehensive clinical and functional, instrumental examination of 148 patients based on the Department of Emergency Medicine of the Republican Hospital № 2 - emergency medical center of Yakutsk from 2009 to 2013. All patients signed the informed consent to participate in the survey. The study was conducted within the framework of the research project «Metabolic syndrome and chronic non-communicable diseases among residents of Yakutia» (Registration number YSU 11 - 01M.2009.).

Study group comprised 88 patients with metabolic syndrome in combination with chronic bronchitis (CB) and chronic obstructive pulmonary disease (COPD) Yakut. The median age was equal to 50,9 ± 0,91 years, gender: women 69.3%, men 30.7%. The study included patients with a diagnosis of «COPD» 44.3%, with a diagnosis of «chronic bronchitis» 55.7%.

The comparison group consisted of 60 patients Yakut with chronic bronchitis and COPD without metabolic syndrome. The average age of 48,9 ± 1,35 years as the age of the main group , by gender, women were 80% , men 20% of patients with a diagnosis of "COPD" 41.7% , with a diagnosis of "chronic bronchitis" 58.3%. For statistical analysis found that the study groups did not significantly differ by age, gender, and the ratio of CB and COPD diagnoses. Regular smokers in the respective groups were 28.4% and 28.3% of those surveyed patients ($p = 0.644$). Analysis of smoking index showed that the value of this indicator in patients with comorbidity is higher at 8,89 ± 1,51 pack - years , compared with 4,5 ± 1,01 pack - years in patients with isolated over CB / COPD ($p = 0.003$).

Diagnoses of "chronic bronchitis" and "COPD" is established based on complaints, medical history, physical examination, spirometry, in accordance with international consensus documents: identification of experts of the World Health Organization, "Global Initiative for Chronic Obstructive Lung Disease" revision 2011, international classification of Disease X revision. Metabolic syndrome is established based on recommendations from the All-Russian Scientific Society of Cardiologist 2009.

The survey was carried out taking into account the patients developed questionnaire approved by the ethics committee, which included questions on blocks: socio-demographic characteristics, medical history, the study of heredity, behavior and health, a validated questionnaire to assess respiratory symptoms in patients with COPD symptoms scale (PL Paggiaro), scale severity of dyspnea Medical Research Council Dyspnea Scale (MRCDS). Spirometry was performed on a hardware-software complex for functional studies "Valenta" (St. Petersburg). Calculated following volume and speed post-bronchodilator lung function: forced vital capacity (FVC), forced expiratory volume in one second (FEV_1), and the ratio of these two parameters (FEV_1/FVC). Statistical data processing and analysis was performed using SPSS statistical software package for Windows. Quantitative measures described in the study groups using the mean values (M) and standard error (m). Check the laws of distribution of quantitative indicators was performed using the Kolmogorov-Smirnov test. Test results showed that the distribution of many quantitative indicators are not subject to the normal law. Therefore, a comparative analysis of quantitative indicators used nonparametric Mann-Whitney test. Study the interaction between qualitative attributes were analyzed using the classical chi-square test of Pearson. Threshold of significance for all statistical tests used accepted meaning of p <0, 05.

RESULTS AND DISCUSSION

With the purpose of studying the clinical manifestations of the combined course of chronic bronchitis/chronic obstructive pulmonary disease (CB/COPD) and metabolic syndrome (MS), we analyzed the clinical data in the main group of the combined course of CB/COPD and MS (n = 88) and a group of isolated CB/COPD (n = 60). We have found statistically significant differences in many clinical manifestations.

Thus, in the group of the combined course of CB/COPD and MS compared to the group of isolated CB/COPD were significantly more patients complained of cough in winter: 86,4% vs 68,3%, p = 0.008 (Table 1). The intensity of cough in combination of CB/COPD and MS was pronounced than in isolated CB/COPD. 46.6 % of patients of the main group were characterized as mild cough, while the comparison group - 48.3 % of patients. Intensification cough up average recorded in 37.5 % of individuals in the group combined flow versus 18.3 % in patients

with isolated chronic bronchitis/COPD (p = 0.003). Expressed cough was noted 8.0% in the main group and only 5% in the comparison group without MS. At the same time increased cough and sputum for the last 3 years was determined in 60.2 % in the case of nosology syntropy CB/ COPD and MS and only in 28.3 % of patients with isolated CB / COPD (p = 0.000).

Thus, we identified heavier cough syndrome in the case of combination of CB/COPD and MS. Our data are consistent with the literature, according to which abdominal obesity causes increased productive cough [9].

By the intensity of sputum we also found statistically significant differences. Thus, the absence of sputum noted only 20.5 % of patients combined course of CB/COPD and MS patients versus 65 % of the comparison group, p = 0.000 (Table 2). For a small amount of sputum complained 60.2 % of patients of the main group against 30.0% of patients at an isolated CB/ COPD. Moderate sputum noted 18.2 % of patients with chronic bronchitis/COPD and MS, and only 5 % of patients in the comparison group (p = 0.000). The color of sputum, reflecting the intensity of inflammatory changes in the bronchopulmonary system, we also recorded a statistically significant difference. The high intensity of inflammation was observed with a combination of chronic bronchitis/COPD and MS - light yellow expectoration in 18.2 % of those in the primary group vs 8,3% in the comparison group; green sputum 18,2% vs 6,7%, respectively, p = 0.001. Thus, the associated flow CB/COPD and MS is characterized by increased sputum and change its nature, due to more severe inflammatory changes in the intensity of the bronchopulmonary system.

Abdominal obesity, a major component of MS, causes increased shortness of breath on exertion, reduces the functionality of the body [9]. Shortness of breath syndrome analysis showed (Table 3) that the association CB/COPD and MS significantly more likely to have wheezing and whistling in the chest (38,6% vs 23,3%, p = 0.05), shortness of breath with wheezing (28,4% vs 15,0%, p = 0.05). In combined course of CB/COPD and MS we found an absence of dyspnea observed only 7.8% of patients, whereas in the case of CB/COPD without MS similar figure was higher at 32.8%, dyspnea during light load was observed in 13.6 % of cases in the study group, and only 1.7 % of cases in the comparison group (p = 0.000). Thus, the syndrome of lack of air more pronounced in the case of combined course of CB/COPD and MS.

Significant differences in the frequency of exacerbations were found in the two groups. Patients with isolated chronic bronchitis/COPD more than half the cases (66.7%) had only one exacerbation per year, whereas the conjugate disease exacerbations were recorded 2 times a year 51.1% , 3 or more in 15.9 %, p = 0.000 (Table 3).

Thus, when we observed associated course of CB/COPD and MS we found more severe clinical manifestations comparison with the isolated CB/COPD due to a more pronounced change in intensity inflammatory bronchopulmonary system due to MS connection that corresponds to the literature data, whereby COPD is characterized by chronic airway obstruction and related endocrine and metabolic disorders, worsen the clinical course and prognosis of patients [8]. Abdominal obesity is associated with the appearance of respiratory symptoms and is another source of systemic inflammation in COPD [2].

Obesity also affects lung function and lung volumes, and is associated with a decrease in expiratory reserve volume and functional residual capacity due to its restrictive extrapulmonary components [3,5]. In the study of respiratory function we found that FEV_1 in the study group was lower than in the comparison group and amounted to 80,3 ± 2,09% vs 84,71 ± 2,62%, respectively (Table 4). Similar association between obesity and central airways obstruction as described in several studies. So, K-B.H. Lam and al., 2010, showed that abdominal obesity was associated with airway obstruction, regardless of smoking status: OR = 1.43 , 95% CI 1,09-1,88 [4]. The study N. Leone, 2009, showed that MS and abdominal obesity is closely associated with lower FEV_1 and FVC, regardless of potential confounding factors [5]. Obesity is associated with restriction of respiratory excursions with reduced lung vital capacity and increased FEV_1/FVC ratio > 70% [6]. In our study, FVC in the study group was 77,53 ± 1,88%, which is slightly smaller in comparison with isolated course of CB/COPD , where this option - 78,50 ± 2,38%. FEV_1/FVC ratio in patients with the association of CB/COPD and MS - 106,8 ± 1,51%, which is also somewhat lower than in patients CB/COPD without the presence of MS - 110,05 ± 1,24%. However, the observed differences in the parameters of respiratory function were not statistically significant.

Thus, in case of comorbidity of chronic bronchitis/COPD and MS we revealed more severe changes in the clinical manifestations. Also, our findings indicate the presence of more pronounced changes in respiratory function in patients with associated course of CB/COPD and MS.

CONCLUSIONS

1. In the combined course of CB/COPD and MS in Yakut ethnic group, we found more severe clinical manifestations in comparison with the group without metabolic syndrome, in the form of a more severe cough syndrome, more severe dyspnea, sputum gain and changes its character, increasing the frequency of exacerbations.

2. In the combined course of chronic bronchitis and chronic obstructive pulmonary disease and metabolic syndrome in Yakut ethnic group, we found that lung function compared

with isolated over these diseases were not significantly different. However, in the combined courses more pronounced disorders of respiratory function in the form of reduced forced vital capacity, decline in FEV_1, FEV_1/FVC ratio increase > 70% were observed in our research.

Table 1

Characteristic of the cough syndrome in the study groups, %

Sign		CB/COPD + MS, Yakut n = 88	CB/COPD, Yakut n = 60	P[1]
Cough in the winter		86,4	68,3	0,008
Increased cough and sputum for 3 years		60,2	28,3	0,000
Cough intensity	no	8,0	23,8	0,003
	easy	46,6	48,3	NS
	moderate	37,5	18,3	0,003
	expressed	8,0	5,0	NS

Note: [1]p - significance of differences chi-squared Pearson

Table 2

Character of sputum in the study groups, %

Sign		CB/COPD + MS, Yakut n = 88	CB/COPD, Yakut n = 60	P[1]
Sputum production	no	20,5	65,0	0,000
	small	60,2	30,0	0,000
	moderate	18,2	5,0	0,000
	large	1,1	0,0	NS
Color	colorless	3,4	21,7	0,001
	white-gray	60,2	63,3	NS
	light yellow	18,2	8,3	NS
	green	18,2	6,7	0,001

Note: [1]p - significance of differences chi-squared Pearson

Table 3

Dyspnea syndrome and the number of exacerbations in the study groups, %

Sign		CB/COPD + MS, Yakut n = 88	CB/COPD, Yakut n = 60	P
Wheezing and whistling in the chest		38,6	23,3	0,050
Shortness of breath with wheezing		28,4	15,0	0,050
The intensity of dyspnea	no	7,8	32,8	0,000
	at moderate load	77,3	65,0	NS
	under light load	13,6	1,7	0,000
	at minimum load	2,3	0,0	NS
The number of exacerbations per year	to 1 times	33,0	66,7	0,000
	to 2 times	51,1	28,3	0,000
	3 or more per year	15,9	5,0	0,000

Note: [1]p - significance of differences chi-squared Pearson

Table 4

Indicators of spirography

Indicator	CB/COPD + MS, Yakut n = 88	CB/COPD, Yakut n = 60	p[1]
	M±m	M±m	
FVC	77,53±1,88	78,50±2,38	0,857
FEV_1	80,3±2,09	84,71±2,62	0,196
FEV_1/FVC	106,8±1,51	110,0±1,24	0,250

Note: [1]p - significance of differences chi-squared Pearson

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