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ANEMIA AND FERROKINETIC PARAMETERS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Abstract
Background: One of the reasons for the high prevalence and mortality in COPD is considered to be untimely unrecognized and unresolved causes of the development of COPD. At the same time, early detection of COPD and treatment started as early as possible slow down the progression of the disease.
Material and methods: 80 patients with COPD were under observation, among whom there were 51 (63.7%) men and 29 (36.3%) women. The average age of the patients was 47±1.5 years. A general blood test was performed according to standard methods. Grade 1 COPD severity was diagnosed in 25 patients, grade II – in 28 and grade III – in 27 patients.
Results: Serum cytokines and chemokines can disrupt the main stages of hematopoiesis; possible mechanisms of anemia in COPD are shortening of erythrocyte apoptosis, impaired mobilization and utilization of iron, and impaired bone marrow response to erythropoietin.When studying ferrokinetics indicators in COPD patients with various degrees of severity, it was noted that as the patients' condition worsens, the hematological status changes with a shift towards anemia.
Conclusion: According to its genesis, anemia in patients with COPD belongs to the so-called, anemia of chronic diseases and can be considered a definite risk factor for the progression of COPD.

Keywords COPD, anemia, ferrokinetic.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality in modern society and represents a significant economic and social problem that does not yet tend to improve [5,8]. It is known that the prevalence, morbidity and mortality of COPD are associated with the prevalence of tobacco smoking and air pollution, and therefore varies in different countries [3,4]. At the same time, in recent years, much attention has been paid to the study of a number of other exogenous and endogenous risk factors for the occurrence and progression of COPD. A number of studies have shown that changes in blood rheology are common in patients with COPD and can be considered a definite risk factor for the progression of COPD. However, the incidence and prognostic role of changes in the main parameters of peripheral blood have not been sufficiently studied [1,6]. In this regard, the purpose of the study was to study the incidence of anemia and ferrokinetic parameters in patients with chronic obstructive pulmonary disease.

METHODS

80 patients with COPD were under observation, among whom there were 51 (63.7%) men and 29 (36.3%) women. Grade 1 COPD severity was diagnosed in 25 patients, grade II – in 28 and grade III – in 27 patients. The diagnosis of "Chronic obstructive pulmonary disease" was established based on the criteria set out in the "Global strategy for the diagnosis, treatment and prevention of COPD" GOLD program (2003). The control group consisted of 20 healthy individuals of the appropriate age. The average age of the patients was 47±1.5 years. A general blood test was performed according to standard methods. Features of ferrokinetics were assessed by hemoglobin concentration (anemia was diagnosed when the level of Hb < 120 g/l in women and Hb < 130 g/l in men) serum iron (normal level in men 8.1-26.6 μmol/l, in women 5.4-26.0 μmol/l), ferritin (normal level in men 30-400 ng/ml, in women under 50 years of age 15-150 ng/ml, in women after 50 years 30-400 ng/ml), transferrin (optimal level 2.0-3.6 g/l).

RESULTS AND DISCUSSION

As a result of the studies, anemia was detected in 17.5% of patients with COPD, and polycythemia in 5%. At the same time, iron deficiency anemia (IDA) was detected in 10 patients with COPD, iron concentration was reduced in 8 patients, serum ferritin was below 100 ng/ml in 9 patients, serum transferrin was reduced in 10 COPD patients with anemia.

Some blood parameters of COPD patients with and without anemia.

Parameters	Control group (n = 20)	COPD without anemia (n = 62)	COPD with anemia (n = 14)	COPD with polycythemia (n = 4)
Hemoglobin, g/l	127±5,87	143,31±2,49**	68,87±2,08	157±15,28
Hematocrit, %	38,1±1,7	42,9±1,7*	31,5±1	47,2±4,4
Red blood cells/pl	4,3±0,2	4,7±0,2	4±0,1	5,8±1
Serum iron, μmol/l	14,3±0,6	13,4±0,7	13,4±0,5	14,5±1,4
Ferritin, ng/ml	184,4±8,4	189,9±7,6	182,7±5,8	187,3±24,3
Transferrin g/l	2,7±0,1	2,2±0,1***	2,1±0,1	2,6±0,2
CRP (log), mg/dl		0,2±0***	0,5±0	0,5±0,1

Note: * P<0.05, ** P<0.01,P<0.001–statistical significance compared to control.***

Thus, every fifth COPD patient examined suffered from anemia, although it is traditionally believed that patients with COPD suffer from polycythemia. This confirms the hypothesis about the inhomogeneity of the phenotypic types of COPD and the need for a differentiated approach in prognosis and treatment of this cohort of patients [2]. At the same time, analysis of iron metabolism indicators during the study demonstrated that not all patients with COPD in combination with anemia suffer from iron deficiency. Therefore, a differentiated approach is necessary when prescribing iron supplements to these patients, depending on the concentrations of iron, ferritin and serum transferrin.

According to the results of our study, the level of C-reactive protein in patients with COPD was significantly higher than in the examined individuals in the control group. Moreover, this indicator was significantly higher in COPD patients with anemia compared to COPD patients without anemia (Table1).

The level of erythropoietin in the blood serum of COPD patients with anemia was 2.5 times higher than the same indicator in COPD patients without anemia. This may be explained by the resistance of the bone marrow of these patients to erythropoietin, which is a common finding in anemia of chronic diseases. [7,9]. According to a number of studies, according to its genesis, anemia in patients with COPD belongs to the so-called. anemia of chronic diseases, i.e. its cause is obviously systemic inflammation. Serum cytokines and chemokines can disrupt the main stages of hematopoiesis; possible mechanisms of anemia in COPD are shortening of erythrocyte apoptosis, impaired mobilization and utilization of iron, and impaired bone marrow response to erythropoietin.

When studying ferrokinetics indicators in COPD patients with various degrees of severity, it was noted that as the patients' condition worsens, the hematological status changes with a shift towards anemia. Among patients with mild COPD, the average hemoglobin level was comparable to that of the control group, while in patients with grade III COPD there were manifestations of anemia. Hematocrit values changed similarly.

However, in the group of patients with stage III COPD, the ferritin indicator was increased both in comparison with the control group and in comparison with the groups of patients with mild and moderate COPD. Obviously, ferritin, which is an indicator of iron depots in the body, was elevated in this group due to impaired transport of iron from the iron depots existing in the body, which indicates a functional iron deficiency in this group of patients.

It should be noted that patients with anemia differed from other patients with COPD in more severe shortness of breath and decreased tolerance to physical activity, which in itself aggravated the course of the disease. A correlation analysis revealed a direct correlation between the degree of anemia and the severity of bronchial obstruction, as well as an inverse correlation between the concentration of C-reactive protein and hematocrit in patients with COPD. This may indicate the pathogenetic role of bronchial obstruction, as well as systemic inflammation in the development of anemia, thereby closing a vicious circle and contributing to an unfavorable prognosis of COPD.

CONCLUSION

Thus, the incidence of anemia in COPD increases as the severity of the disease increases. According to its genesis, anemia in patients with COPD belongs to the so-called, anemia of chronic diseases and can be considered a definite risk factor for the progression of COPD. In this regard, a differentiated approach is required in the management of patients with COPD with anemia, depending on the concentrations of iron, ferritin and serum transferrin.

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