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CONTENTS

SOCIO HUMANITIES.

AGRICULTURAL AND BIOLOGICAL SCIENCES.

NEUROSCIENCE.

MEDICAL SCIENCES.

MEDICINE AND DENTISTRY.

PHYSICAL SCIENCES.

CHEMICAL TECHNOLOGY.

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CELLULAR REACTIVITY AND STRESS LEVEL ADAPTIVITY OF PATIENTS WITH CORONARY HEART DISEASE

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Abstract: In patients with coronary heart disease cellular body reactivity decreases in 6.9 times, which is confirmed by leukocyte intoxication index decrease by Ya.Ya. Kalf -Kalif by 43.18%, by B. A Reis – by 39.23%, hematological intoxication index by V. S. Vasiliev – by 8.39%. Adaptive processes in patients with coronary heart disease occur in the majority of patients (54,06%) in a calm and high activation zone, which is a positive prognostic sign of the disease in most patients with coronary heart disease.

Key words: coronary disease, cellular body reactivity, stress adaptation.

Coronary heart disease is pathogenically connected with atherosclerosis, with endured myocardial infarction, as a consequence of universal inflammatory reaction of endothelium and the deteriorating impact of various factors (risk factors) – viruses, Chlamydia and other microorganisms, that due to their protein-lipid composition have affinity to endothelial cells [2, 4, 8]. Coronary disease runs on the background of characteristic, genetically determined changes of not only metabolic syndrome, but also changes in the system of unspecific and specific immune processes of body protection. At the first stage, these changes run on the background of cellular reactivity and adaptive processes in patients suffering from coronary disease [6, 7]. These questions are not highlighted enough in periodicals. That's why cellular reactivity study in patients suffering from coronary disease in combination with adaptive level of body stress will give new scientific grounded additional pathogenesis links of coronary disease intercourse and treating tactics development.

Objective of the research. To identify cellular reactivity and body stress adaptation level in patients suffering from coronary disease.

Resources and methods.

Clinic-laboratory examination was conducted among 37 patients suffering from coronary disease aged 27-74 (average age 56, 25±10, 21, in men – 19, women – 18) with the help of consultive guidance of Doctor of medical science, Professor L. P. Sydorchuk – the head of family medicine department of HEI of Ukraine, "Bukovynian state medical university". Control group was composed of healthy people of age 27-67 (average age 46, 21±4, 41).

One of the most fundamental methods of clinic-laboratory investigation of patients and in particular patients suffering from the coronary disease, higher importance is obtained by immune hematologic diagnosis. For authenticity and informational content optimization of this method, new various hematologic analyzers are developed. For identification of cellular reactivity level and body stress adaptation in patients suffering from the coronary disease, hematologic analyzer of HB series was used. For laboratory examination of patients and practically healthy people undiluted venous blood was taken, that was placed in a clean test-tube with anticoagulant EDTA-K2· $2H_2O$, that retains the structure

of lymphocytes, leucocytes, monocytes/macrophages and erythrocytes and prevents thrombocyte accumulation. The process of absolute and relative quantity calculation of the major populations and immunocompetent cells was conducted according to the instructions written in "The User's Manual".

Adaptation stress level and cellular reactivity of the body in patients suffering from coronary disease were evaluated according to the immunohematologic values and adaptive index that is identified as a ratio of a relative amount of lymphocytes and segmental nuclear neutrophilic granulocytes. Immune hematologic indexes and coefficients were calculated by methods described above [1, 3, 5, 6, 7].

Statistic elaboration of the obtained results was conducted by various statistics methods with identification of average values and standard error (M±m), criterion Student (t) and probability values (P). Values P<0,05 are considered to be authentic. Statistic treatment was done on the computer IBM Pentium-IV, packet Microsoft Excel Professional for Windows XP and the programme Stat Plus Professional 2009.

Investigation results and their discussion.

A leading role in provision of cellular reactivity and human body adaptive activity is played by blood circulation as a secondary systemic organ of the immune system. Primarily, the blood system role is identified by its transportation function of nutritious elements and oxygen – the main energy sources for cells and tissues. In addition, blood system is one of the most important information carriers about the processes that develop and act on the tissue level, but immunocompetent cells that fulfill functions of blood formation and immune reactivity of periphery blood are very susceptible to changes of the environment inhabitance and internal organisms state (pathologic processes, diseases, etc.) [2, 4]. Cellular reactivity is identified by the values of immune hematologic indexes and coefficients, adaptive processes – by the lymphocytes and segmental nuclear neutrophilic granulocytes ratio that is based on the absolute and relative amount of the major populations of immunocompetent cells. So, the first and initial stage was the investigation of the absolute and relative quantity of the major populations of immunocompetent cells of periphery blood in patients suffering from coronary disease. Generalized investigation results are given in the table 1.

Table 1

Absolute and relative amount of the major populations of immunocompetent cells of periphery blood in patients suffering from coronary disease

Populations of immuno-competent cells	Units	Patients suffering from coronary disease (n=37) M±m	Practically healthy people (n=30) M±m	Level of immune disturbances	P
Lymphocytes	%	35,30±1,65	27,50±0,91	+I	<0,05
	$x10^9$/l	2,29±0,27	1,34±0,17	+III	<0,05
Monocytes	%	5,59±0,49	4,86±0,45	+I	>0,05
	$x10^9$/l	0,37±0,04	0,24±0,02	+II	<0,05
Agranulocytes	%	40,93±1,47	32,36±1,18	+I	<0,05
	$x10^9$/l	2,61±0,26	1,58±0,17	+II	<0,05
Granulocytes	%	59,11±1,17	64,86±1,81	-I	<0,05
	$x10^9$/l	3,85±0,42	3,17±0,32	-I	>0,05
Neutrophilic granulocytes	%	56,59±1,16	62,63±1,61	-I	<0,05
	$x10^9$/l	3,68±0,41	3,06±0,30	+I	>0,05
Segmental nuclear neutrophils	%	51,19±1,14	59,53±2,89	-I	<0,05
	$x10^9$/l	3,31±0,39	2,91±0,31	+I	>0,05
Rod-like nuclear neutrophils	%	5,41±0,49	3,10±0,52	+III	<0,05
	$x10^9$/l	0,36±0,04	0,15±0,02	+III	<0,05
Eosinophilic granulocytes	%	2,44±0,18	2,23±0,17	+I	>0,05
Basophilic granulocytes	%	in 4 patients-1,0%	-	-	-
Leucocytes	$x10^9$/l	6,01±0,62	4,88±0,97	+I	<0,05
Thrombocytes	g/l	214,74±2,09	202,37±2,02	+I	<0,05
Erythrocytes	$x10^{12}$/l	4,50±0,57	4,73±1,01	-I	<0,05
Haemoglobin	g/l	136,61±10,27	121,75±2,17	+I	>0,05
Colour coefficient		0,89±0,11	0,87±0,09	+I	>0,05
ESS	мм/h	6,46±0,33	6,08±0,31	+I	>0,05
Average age	Years old	56,25±10,21	46,21±2,41	+I	>0,05

It has been shown that in patients suffering from coronary disease the absolute agranulocytes quantity increases by 65,19% at the expense of absolute lymphocytes quantity increase by 70,90% and monocytes – by 54,17% in the periphery blood. We can also observe the absolute rod-like nuclear neutrophils quantity increase in 2,4 times and thrombocytes – by 3,11%. Absolute lymphocytes and monocytes quantity increase suggests the formation of adaptive specific immune in patients.

Considerable importance in diagnosis, prognosis and disease course have the values of the relative major

populations quantity of immunocompetent cells. The relative agranulocytes quantity in patients suffering from coronary disease rises by 26,48% at the expense of relative lymphocytes quantity increase by 28,36% and monocytes – by 15,02% that proves the fact of specific immune response formation.

According to this, relative quantity of granulocytic leucocytes decreases by 18,42% due to the relative major populations – neutrophilic granulocytes quantity decrease – by 10,67% including mature population of neutrophilic granulocytic segmental nuclear neutrophils – by 16,29%, and also new forms – rod-like nuclear neutrophilic granulocytes by 74,52%. These changes justify the activation of unspecific factors and mechanisms of anti-infective body protection in patients suffering from coronary disease. Other values that have tendency to decrease or increase are given in Table 1.

Taking into consideration that blood system (immunocompetent cells and its humoral part) is one of the most essential carriers of information about processes that function in a human body on the cellular and tissue level, it should be noted that the absolute and relative values of immunocompetent cells during diagnosis, therapeutic tactics and prognosis formation of the main disease course [3, 6]. In our case, obtained results have been used to identify the cellular reactivity in patients suffering from coronary disease and to identify the level of body stress adaptation of these patients. Results of identifying the cellular reactivity in patients suffering from coronary disease are given in Table 2.

Table 2

Cellular reactivity level in patients suffering from coronary disease

Immune hematologic values	Units	Patients suffering from coronary disease (п=37) M±m	Practically healthy people (п=36) M±m	Level of cellular reactivity disturbance	p
Leucocyte intoxication index by Y.Y. Kalf-Kalif	e.u.	0,88±0,10	1,26±0,15	-I	<0,05
Leucocyte intoxication index by B.A. Reis	e.u.	1,30±0,09	1,81±0,12	-I	<0,05
Hematologic intoxication index by V. S. Vasyliev	e.u.	33,02±0,29	35,79±0,33	-I	<0,01
Hematologic index by Khimich	e.u.	0,34±0,4	0,31±0,04	+I	>0,05
Nuclear index of endotoxication level	e.u.	0,11±0,01	0,05±0,01	+III	<0,01
Modified leukocyte intoxication index	e.u.	1,34±0,13	1,84±0,18	-I	<0,05
Leucocytes and ESS ratio index	e.u.	0,93±0,07	0,80±0,06	+I	>0,05
Lyphocyte granulocyte index	e.u..	0,60±0,05	0,42±0,03	+II	<0,05
Intoxication index	e.u.	0,34±0,03	0,37±0,04	-I	>0,05
Cellular reactivity index	e.u.	121,41±1,11	838,20±4,27	-III	<0,001

It has been shown that according to the value of cellular reactivity index level in patients suffering from coronary disease, the cellular reactivity of these patients drastically drops in 6,9 times that shows its confirmation in other immune hematologic indexes and coefficients decrease. Thus, level of leucocyte intoxication index values by Y. Y. Kalf-Kalif go down by 43,18%, by B.A. Reis – by 39,23%, hematologic intoxication index by V. S. Vasyliev – by 8,39%, modified leukocyte intoxication index – by 35,07%, and also hematologic index by Khimich with a tendency to increase by 9,68%, nuclear index of endotoxication level in 2,2 times, lymphocyte granulocyte index by 42,86%. The last value suggests about the intoxication increase that is conditioned by degenerative processes in the body that lead to the formation of autointoxication and toxication, connected with infectious process in the bodies of patients suffering from coronary disease. Such concept is proved by considerable increase (by 16,25%) of leucocytes and ESS ratio index [3,4].

Thus, patients suffering from coronary disease possess decreased cellular body reactivity that is proved by leucocyte intoxication level values, endotoxic nuclear index level increase, lymphocyte granulocytic index which are characterized by endotoxication conditioned mainly by autoimmune processes. Any human disease is accompanied by various levels of stress adaptation. Leading role in provision of adaptive body activity is played by blood system. This role is manifested mainly by transportation function of nutritious elements and oxygen – the main energy sources for cells and tissues. The results of body stress adaptation level in patients suffering from coronary disease are given in Table 3.

Table 3

Body stress adaptation level in patients suffering from coronary disease

Indexes	Patients suffering from coronary disease (п=37) M±m	Practically healthy people (п=36) M±m	Adaptive body stress level disturbances	p
Adaptive index	0,69±0,08	0,46±0,04	+II	<0,05

Stress adaptation zones

Zone	abs.	%	abs.	%	P
Stress zone	8	21,62	0	-	-
Training zone	9	24,32	9	30,00	>0,05
Calm activation zone	11	29,74	18	60,00	<0,05
High activation zone	9	24,32	3	10,00	<0,05

According to the adaptation index level values, the level of adaptation processes in patients suffering from coronary disease increases and is located in high activation zone. In addition, in 2 patients (21,62%) adaptive processes are in stress indexes (AI=0,29). In majority of patients suffering from coronary disease adaptation activity is in the state of calm and high activation reaction zone that is favourable prognostic value of disease course in the majority of patients. It is manifested in people aged under 60.

Conclusions: 1. Patients suffering from coronary disease have 6,9 times lower cellular body reactivity that is proved by lowering leucocyte intoxication index values by Y. Y. Kalf-Kalif by 43,18%, by B. A. Reis - by 39,23%, hematologic intoxication value by V. S. Vasiliev – by 8,39%.

2. Lymphocyte granulocytic index decrease justifies body intoxication presence in people suffering from coronary disease conditioned by autoimmune processes (degenerative processes of body cells) and is confirmed by erythrocyte absolute quantity and erythrocyte sedimentation speed ratio increase by 16,25%.

3. Adaptation processes in patients suffering from coronary disease are located in calm and high activation zone in the majority of patients (54,06%), that is a positive prognostic feature of the disease course in patients suffering from coronary disease.

Perspectives of further investigations. Obtained results are the basis of unspecific body reactivity identification in patients suffering from coronary disease and immunologic body resistance.

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