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INDICATORS OF SYSTEMIC IMMUNITY IN PATIENTS WITH DIFFERENT SEVERITY OF ACNE VULGARIS IN RESIDENTS OF IODINE DEFICIENCY AREA

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Abstract. In patients with acne vulgaris – the inhabitants of the natural biogeochemical iodine deficiency region, changes in the immune system that indicate the formation of a secondary immunodeficiency state, mainly T-lymphocytes, and reduced phagocytic activity of phagocytic blood cells that are interdependent with the severity of clinical manifestations of dermatosis have been detected.

Keywords: acne vulgaris, iodine deficiency area, systemic immunity.

Introduction. Acne vulgaris is one of the most common skin diseases which is registered in 80-90 % of teenagers and young working people [1, 7, 8]. The localization of acne on the exposed skin (face, upper trunk, shoulders), development of resistance to the methods of basic therapy cause psycho-emotional disorders, decrease quality of their life and social activity which defines the essential health and social importance of this dermatosis [4, 7, 10].

According to current researches, pathogenesis of acne vulgaris is complex and multifactor, however it has not been studied properly. It was established that acne vulgaris appears on the basis of genetic susceptibility due to irregularities of the sebaceous glands function, pathological desquamation of sebaceous follicle epithelium and activation of the skin flora (Propionibacterium acnes, Staphylococcus epidermis and others). The changes in endocrine regulation, immune system as well as in metabolism contribute to the development of inflammatory processes in the skin.

The changes in the immune system as well as the thyroid gland functional state, having multifaceted regulatory impact upon metabolic processes in the organism of patients proved to be important in the development and chronicity of dermatoses [1, 7, 2]. The study of the thyroid gland and systemic immunity condition in patients with acne vulgaris, living in a region with natural iodine deficiency is relevant.

The purpose of the study. The aim of the study was to identify the indicators of systemic immunity in patients with acne vulgaris with different degrees of severity of dermatosis living in areas with natural iodine deficiency.

Material and methods. 75 patients, permanent residents of Chernivtsi region with acne vulgaris were observed. It is the natural biogeochemical region with iodine deficiency [2]. Among the patients there were 26 males and 49 females aged 18 to 29 years. According to the classification of acne vulgaris [6], the majority (42 – 56,0 %) of the patients were diagnosed as having an average severity of dermatitis, 17 (22,7 %) of them had a mild course and in 16 (21,3 %) patients a severe form of acne vulgaris was found. The duration of dermatosis in examined patients ranged from 6 months to 8 years. The control group consisted of 22 practically healthy persons of the same age.

In determining the functional state of these patients' pituitary-thyroid system according to serum triiodothyronine, thyroxine and thyroid-stimulating hormone and to results of sonographic examination of thyroid gland [3], it was established that more than half (55,8 %) of the patients with acne vulgaris from natural biogeochemical regions with iodine deficiency had changes in the thyroid gland function, which are more often common among the patients with moderate and severe clinical course of dermatosis.

To assess the cellular and humoral immune system in patients with acne vulgaris, total number of T-lymphocytes, active T cells, T-helper (Th) and T-suppressor lymphocytes (Ts), immunoregulatory index - IRI (Th/Ts), the number of B-lymphocytes, the content of serum immunoglobulins (Ig) classes M, G, A and circulating immune complexes (CIC) were determined, and to assess phagocytosis state, we determined the phagocytic activity and phagocytic number of polymorphonuclear leukocytes and did a test of nitroblue tetrazole recovery (NBT – spontaneous test) and NBT- the test stimulated with pirogenal (NBT stimulated test) carried out according to well-known methods [V.V. Menshikov, 1987; Kuznik B..I. and co-authors, 1989].

A statistical processing of the research results was carried out by means of a statistical analysis [5] using the computer program Statistica 6.0, according to the probable difference as medium at p<0,05.

Results and discussion. In determining the parameters of the immune system in 75 patients with acne vulgaris who permanently reside in natural iodine deficiency, we found (Table 1) signs of secondary immunodeficiency state, and mainly T-cell population of lymphocytes. For instance, in patients, examined for acne vulgaris, we revealed the likely, compared to the control group, relative decrease in the total number of T cells (17,2 %, p<0,001), and active T-lymphocytes (17,7 %, p<0,001). At the same time, in patients with acne vulgaris, changes in cellular composition of subpopulations of T-lymphocytes were found, namely, the likely reduction in the number of T-helper lymphocytes (21,1 %, p<0,001) in less expressive reduction of T-suppressor lymphocytes (by 13,0 %, p<0,05), but no significant changes in immunoregulatory index. Moreover, the patients with acne vulgaris had mod-

Table 1

**Indicators of systemic immunity in patients with acne vulgaris – the inhabitants
of the region of iodine deficiency**

Indicators	Units	The control group (n=22)	Patients with Acne Vulgaris (n=75)
T- lymphocytes	%	44,1±1,32	36,5±0,717[***]
T -lymphocytes active	%	28,8±0,572	23,7±0,752[***]
T-suppressor lymphocytes	%	16,9±0,754	14,7±0,426[*]
T-helper lymphocytes	%	27,9±1,17	22,0±0,588[***]
Immunoregulatory index		1,71±0,097	1,59±0,057
B- lymphocytes	%	26,6±1,05	23,8±0,310[***]
Ig A	g / l	3,63±0,174	2,93±0,099[***]
Ig M	g / l	1,22±0,071	1,17±0,033
Ig G	g / l	13,4±0,844	17,9±0,416[***]
Circulating immune complexes	Absorbance units	96,1±4,08	88,6±2,61
Phagocytic activity	Standard units	71,4±1,26	68,9±0,521[*]
Phagocytic number	%	5,06±0,232	5,01±0,082
NBT -test spontaneous	%	13,7±0,931	9,85±0,313[***]
NBT test stimulated	%	32,1±0,823	30,1±0,385[*]

Notes: 1. n - number of observations. 2. * - The degree of probability of the difference relative to the control group of indicators: * – $p<0,05$; ** – $p<0,01$; *** – $p<0,001$

erate decrease (by 10,5 %, $p<0,001$) of relative number of B-lymphocytes.

The analysis of humoral immune system in patients with acne vulgaris from the iodine deficiency region detected (Table 1) an increase of immunoglobulin G in serum (by 33,6 %, $p<0,001$) with a reduction of immunoglobulin A (19,3 %, $p<0,001$) without significant changes in the level of immunoglobulin M and in the content of circulating immune complexes in serum.

Results of immunological studies in patients with acne vulgaris (Table 1) also showed a significant reduction of phagocytic activity of their polymorphonuclear leukocytes (by 3,5 %, $p<0,05$) and a significant decrease of NBT-test (28,1 % $p<0,001$) and NBT stimulated test (by 6,2 %, $p<0,05$), characterizing the final stages of phagocytic process.

The results of determination of systemic immunity in patients with acne vulgaris with different degrees of severity of dermatosis are presented in Table 2.

According to the data shown in Table 2, the patients with mild forms of acne vulgaris only had a moderate decrease in the relative number of active T-lymphocytes (11,5 %, $p<0,05$), while the level of total and T-helper lymphocytes which are the main coordinating cells of immunological protection, were within the mark. These patients also had a moderate decrease in the number of B-lymphocytes (12,0 %, $p<0,05$) an increase in Ig G (by 22,4 %, $p<0,05$) on the background of Ig A reduction(19,8 %, $p<0,001$),

and a drop of spontaneous NBT test index (by 25,5 %, $p<0,01$).

More pronounced changes in immunological parameters were found in patients with acne vulgaris of moderate severity of dermatosis such as significant decrease both compared with the control group and with patients having mild forms of acne vulgaris: the relative amount of total T-lymphocytes (respectively: 17,9 % $p<0,001$ and 13,0 %, $p=0,001$), T-suppressor (respectively: 15,4 %, $p<0,05$ and 13,3 %, $p<0,05$) and T-helper lymphocytes (respectively: 20,4 %, $p<0,001$ and 11,9 %, $p<0,05$). Also, the patients with moderate severity acne vulgaris had significant, compared with control group, decrease in active T-cells (14,2 %, $p<0,05$) and B-lymphocytes (9,4 %, $p<0,05$), and a marked increase in Ig G (by 37,3 %, $p<0,001$; compared with patients having mild forms of acne – 12,2 %, $p<0,05$) against Ig A decrease (16,0 %, $p<0,001$). At the same time, these patients also had a decrease of phagocytic activity (3,8 %, $p<0,05$), spontaneous NBT test (by 26,3 %, $p<0,001$) and stimulated NBT test (8,8 %, $p<0,01$).

However, the most significant changes in systemic immunity were found in patients with severe acne vulgaris – the likely performance as compared to the control group and patients with mild and moderate forms of acne vulgaris decrease in the relative number of T-lymphocytes overall (by 27,2 % and 28,8 %, $p<0,001$ and 11,3 %, $p<0,01$), active T-

Table 2

Indicators of systemic immunity in patients with acne vulgaris varying severity

Indicators, units	The control group (n=22)	Patients with Acne Vulgaris of varying severity (n=75)		
		Mild (n_1=17)	Moderate (n_2=42)	Severe (n_3=16)
T- lymphocytes,%	44,1±1,32	41,6±1,49	36,2±0,829*** p_{1-2}=0,001	32,1±0,844*** p_{1-3}<0,001; p_{2-3}<0,01
T -lymphocytes active, %	28,8±0,572	25,5±1,19*	24,7±1,093* p_{1-2}>0,05	18,4±0,651*** p_{1-3}<0,001 p_{2-3}=0,001
T-suppressor lymphocytes, %	16,9±0,754	16,5±0,563	14,3±0,647* p_{1-2}<0,05	15,1±0,432 p_{1-3}>0,05; p_{2-3}>0,05
T-helper lymphocytes, %	27,9±1,17	25,2±1,26	22,2±0,688*** p_{1-2}<0,05	18,7±0,433*** p_{1-3}<0,001; p_{2-3}<0,01
Immunoregulatory index, %	1,71±0,097	1,56±0,094	1,67±0,076 p_{1-2}>0,05	1,32±0,104* p_{1-3}>0,05; p_{2-3}<0,05
B- lymphocytes, %	26,6±1,05	23,4±0,428*	24,1±0,47* p_{1-2}>0,05	23,2±0,593* p_{1-3}>0,05; p_{2-3}>0,05
Ig A, g / l	3,63±0,174	2,91±0,194**	3,05±0,126** p_{1-2}>0,05	2,68±0,239** p_{1-3}>0,05; p_{2-3}>0,05
Ig M, g / l	1,22±0,071	1,12±0,075	1,19±0,038 p_{1-2}>0,05	1,34±0,039 p_{1-3}<0,05; p_{2-3}<0,05
Ig G, g / l	13,4±0,844	16,4±1,13*	18,4±0,52*** p_{1-2}<0,001	17,8±0,656*** p_{1-3}>0,05; p_{2-3}>0,05
Circulating immune complexes	96,1±4,08	84,0±4,64	90,6±3,847 p_{1-2}>0,05	87,0±4,67 p_{1-3}>0,05; p_{2-3}>0,05
Phagocytic activity	71,4±1,26	69,8±1,17	68,7±0,508* p_{1-2}>0,05	64,2±1,11*** p_{1-3}<0,01; p_{2-3}<0,001
Phagocytic number	5,06±0,232	5,0±0,111	5,04±0,095 p_{1-2}>0,05	4,39±1,126* p_{1-3}<0,001; p_{2-3}<0,001
NBT -test spontaneous, %	13,7±0,931	10,2±0,660**	10,1±0,466*** p_{1-2}>0,05	8,63±0,287*** p_{1-3}<0,05; p_{2-3}>0,05
NBT test stimulated, %	32,1±0,823	32,2±0,570	29,3±0,575** p_{1-2}<0,01	28,9±0,464** p_{1-3}<0,001; p_{2-3}>0,05

Notes: 1. n - number of observations. 2. * - The degree of probability of the difference relative to the control group of indicators: * – p<0,05; ** – p<0,01; *** – p<0,001. 3. p_{1-2}, p_{1-3}, p_{2-3} – the probability of the difference in performance of different groups of patients

lymphocytes (respectively: 36,1 % and 27,8 %, p<0,001 and 25,5 %, p<0,01) and patients with moderate forms of acne (by 1,26 times at p<0,05). The patients with severe acne vulgaris had a significant, compared with the control group, reduction in the number of B-lymphocytes (12,8 %, p<0,05) and levels of Ig A (by 26,2 %, p<0,01) against the background of the Ig G increase (by 32,8 %, p<0,001).

All the parameters of phagocytosis which were under study in the patients with severe acne vulgaris changed. For instance, the patients with severe acne vulgaris had significant, as compared both with individuals in the control group and in patients with mild and moderate forms of acne reduction in phagocytic activity (respectively: 1,1 %, p<0,001, 8,0 % and 6,6 %, p<0,01) and phagocytic number (respectively: 13,2 %, p<0,05, 12,2 % and 12,9 %, p<0,001). At the same time, in these very patients had reduction compared with individuals in the control group and patients with mild forms of acne vulgaris in spontaneous NBT test indices (respectively: 37,0 %, p<0,001 and 15,4 %, p<0,05) and stimulated NBT test (respectively: 10,1 % , p<0,01 and 10,2 %, p<0,001).

Thus, the most significant changes of the studied parameters of systemic immunity and phagocytosis were found in patients with acne vulgaris in iodine deficiency region with moderate and especially severe course of dermatosis. In general it should be considered when administering complex treatment of this dermatosis to such patients.

Conclusions

1. In patients with acne vulgaris, living in the area of natural biogeochemical iodine deficiency, changes in systemic immunity, combined with manifestations of secondary immunodeficiency state, mainly T-lymphocytes population, as well as a reduction in phagocytic activity of phagocytic blood

cells that are most significant in patients with moderate and severe course of dermatosis have been detected.

2. Our studies indicate the great importance of immune disorders in the pathogenesis of acne vulgaris in patients living in iodine deficiency region, which aggravate the course of dermatosis and substantiate the advisability of the patients' rational therapy.

Prospects for further research. The development and evaluation of clinical efficacy of complex treatment of patients with acne vulgaris who live in an iodine deficiency region and administration of an adequate therapy to them are the main prospects for further research.

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ПОКАЗАТЕЛИ СИСТЕМНОГО ИММУНИТЕТА У БОЛЬНЫХ ВУЛЬГАРНЫМИ УГРЯМИ С РАЗНОЙ СТЕПЕНЬЮ ТЯЖЕСТИ – ЖИТЕЛЕЙ ЙОДОДЕФИЦИТНОГО РЕГИОНА

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Резюме. У больных вульгарными угрями – жителей биогеохимического региона с природным йододефицитом установлены изменения показателей системного иммунитета, которые свидетельствуют о формировании вторичного иммунодефицитного состояния, преимущественно по Т-клеточному звену, а также снижение фагоцитарной активности фагоцитирующих клеток крови, которые находятся во взаимозависимости со степенью тяжести клинических проявлений дерматоза.

Ключевые слова: вульгарные угри, йододефицитный регион, системный иммунитет.

ПОКАЗНИКИ СИСТЕМНОГО ІМУНІТЕТУ У ХВОРИХ НА ВУЛЬГАРНІ ВУГРИ З РІЗНИМ СТУПЕНЕМ ТЯЖКОСТІ – МЕШКАНЦІВ ЙОДОДЕФІЦИТНОГО РЕГІОНУ

Ю.П. Карвацька, О.І. Денисенко

Резюме. У хворих на вульгарні вугри – мешканців біогеохімічного регіону з природним йододефіцитом встановлено зміни показників системного імунітету, які свідчать про формування вторинного імунодефіцитного стану, переважно за Т-клітинною ланкою, а також зниження фагоцитарної активності фагоцитувальних клітин крові, які перебувають у взаємозалежності зі ступенем тяжкості клінічних проявів дерматозу.

Ключові слова: вульгарні вугри, йододефіцитний регіон, системний імунітет.