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THE IMPORTANCE OF SUPEROXIDE DISMUTASE IN THE FORMATION OF ACNE

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ABSTRACT

The article provides information on oxidative stress and antioxidant protection, in particular the role of superoxide dismutase in the pathogenesis of acne. The authors' own data on the study of the content of superoxide dismutase (SOD) in the blood serum of acne patients are presented and its statistically significant decrease against the control group is revealed. The low level of SOD depended on the duration and severity of the disease.

Key words: acne, oxidative stress, antioxidant activity, superoxide dismutase.

INTRODUCTION

Acne (synonyms: vulgar acne) is a polymorphic multifactorial chronic disease of the sebaceous glands and hair follicles [3]. Acne is an urgent problem of dermatocosmetology, since 80% of adolescents and young people suffer from it, the pathophysiology of its formation has not been fully studied and the methods of acne therapy do not fully satisfy either doctors or patients. Localization of rashes on the face causes a certain cosmetic defect, affects the mental state of patients and significantly reduces their quality of life [14].

Many dermatologists believe that women and men suffer from acne approximately equally [11,6].

Despite numerous studies, the etiology and pathogenesis of acne have not been fully studied. Currently, acne patients have been found to have increased expression of cytokines and other inflammatory markers, such as IL-1a, TNF- α , IL-1b, IL-8, IL-10, matrix metalloproteinases, etc.[4], increased activity of antimicrobial peptides (AMP) as a reaction to infectious agents [9, 10], activation of the Toll-like receptor (TLR-2) [5].

Some authors have shown that mononuclear cells, under the influence of laboratory strains of P. acnes, are able to synthesize proinflammatory interleukins (IL-12, IL-17, IL-22, LL-37, etc.) [7,1].

Increased proinflammatory cytokines, metalloproteinases, antimicrobial peptides, Toll-like receptor, microbial factors (P. acnes They activate the cellular immune response and the inflammatory process. The inflammatory process is often accompanied by increased oxidative stress and a decrease in antioxidant activity, in particular the enzyme superoxide dismutase (SOD). Studies have established that SOD is a key enzyme that reduces the content of lipid peroxidation products (POL) and blocks superoxide radicals (O_2^-), which, as a reactive oxygen species (RFA), can damage cells and tissues [12,13].

A number of scientific papers have been devoted to the study of SOD content in patients with acne. For example, scientists have found a decrease in the content of SOD in patients with acne vulgaris. The researchers revealed a decrease in the level of SOD in the blood serum, which was accompanied by an increase in POL products. The authors believe that this process leads to the development of oxidative stress and damage to body cells, in particular the skin [2]

A.S. Zheltysheva and L.A. Novikova (2011) noted a decrease in the activity of the antioxidant system in acne patients, in particular SOD and an increase in the ability of LDL to oxidize. In this study, the SOD content was 0.18=0.01 ng/ml, which significantly decreased compared to the values of healthy individuals (0.31=0.0 ng/ml, p<0.05). The authors also believe that in acne patients, a decrease in the activity of antioxidant protection is accompanied by the development of oxidative stress [17].

Scientists from South Korea and Germany in acne patients revealed a significant increase in the level of malondialdehyde (MDA) and xanthine oxidase activity, and a decrease in the activity of SOD and catalase in the blood serum. According to the authors, due to a decrease in the activity of SOD and catalase, oxidative stress is noted and this should be taken into account in the development of therapeutic measures for acne patients [8].

The clinical manifestations and course of acne are described in detail in manuals and monographs. Existing classifications are based either on the clinical manifestations of the disease or on an assessment of its severity of acne. [16,15]

In connection with the above data, the purpose of our work was to study the content of SOD in the blood serum of acne patients, taking into account the clinical course of dermatosis.

There were 133 patients suffering from acne under our clinical supervision. There were 78 men (58.6%) and 55 women (41.3%), aged 16 to 29 years. When analyzing the age of patients, taking into account their gender, it was revealed that the vast majority of patients were between the ages of 19 and 24 (%). The distribution of patients by age and gender is shown in Table 1.

Table 1

Age	Women		Μ	en	Total	
	abc	%	abc	%	abc	%
11-18 years old	24	43.7	37	47.5	61	45,9%
19-24 years old	19	34.5	30	38.4	49	36,9%
25-30 years old	6	10.9	10	12.9	16	12%
31 and more	6	10.9	1	1.2	7	5,2%
Total	55	100	78	100	133	100

Distribution of patients by age and gender

The observed patients suffered from acne from 3 months to 15 years. At the same time, 21 (19.3%) patients were ill before the age of 1, 19 (22.9%) from 1-3 years old, 22 (26.5%) from 3 to 5 years old and 21 (19.3%) patients over 5 years old. Most of the patients suffered from acne from 1 to 5 years.

Table 2

Severity of the current	Women		Men		Total	
	Abc	%	Abc	%	Abc	%
Light degree	21	38.1	30	38.4	51	38.4
The average degree	25	45.5	38	48.8	63	47.4
Severe degree	9	16.4	10	12.8	19	14.2
Total	55	100	78	100	133	100

Distribution of acne patients according to severity and gender

As you know, many therapeutic and preventive measures are carried out according to the severity of acne. According to the classification proposed by the Global Alliance for Improving Acne Outcomes, the patients we observed were divided into 3 groups: mild (38.4% of patients), moderate (47.4% of patients) and severe (14.2% of patients). We observed all degrees of severity among male patients (38.4%, 48.8%, and 12.8%, respectively). The distribution of acne patients according to severity and gender is shown in Table 2.

The content of SOD in blood serum was studied in 83 acne patients using a modified technique by T.V. Sirota [17].

The results of the study showed that in the blood serum of acne patients, there is a statistically significant decrease in the content of SOD (107.1 ± 6.9 units) compared to the group of healthy individuals (201.5 ± 28.6 units). The results of the SOD content in the blood serum of acne patients are presented in Table 3.

Table 3

	Number of	Act of SOD	t	р
Investigated	examined	in serum		
groups	patients	blood,		
	-	conl. units.		
Control group	16	201,5±28,6		
(conlhealthy)			11 0	<0.001
The general group of	02	107,1±6,9*	11.2	<0.001
acne patients	00			

The content of SOD in the blood serum of acne patients and the control group

Note: p is the reliability of the data in relation to the control

* - p <0.001;

Analysis of the content of SOD in the blood serum of acne patients, taking into account the duration of the disease, it was found that, as the duration of the pathological process increased, the content of the SOD enzyme decreased in parallel. At the same time, in acne patients with a disease duration of up to 1 year, the SOD content (129.8±16.0 con. units) significantly decreased and statistically significantly differed from the control group (p<0.05). With the duration of acne from 1 to 3 years, the level of SOD in the blood serum decreases even more compared to the indicators of healthy individuals (201.5±28.6) and amounted to 112.6±13.4 conl. units. Both compared indicators of these groups had high statistical significance (p<0.01). In patients with acne from 3 to 5 years and more than 5 years, the SOD content in the blood serum was the lowest and there was a high level of statistical significance (p<0.001) in relation to the indicator of healthy individuals. The content of SOD in

the blood serum of acne patients, depending on the duration of the disease, is shown in Table 4.

Table 4

Investigated	Number	Act of SOD	t	р
groups	of	in serum		
	patients	blood,		
		conl. units.		
The control group	16	201,5±28,6		
Prescription of the disease up to 1 year	21	129,8±16,0*	2.32	< 0.05
Prescription of the disease from 1 year to 3 years	19	112,6±13,4 **	2.97	<0.01
The duration of the disease is from 3 years to 5 years	22	96,0±11,5***	3.80	<0.001
The prescription of the disease is more than 5 years	21	90,9±13,0***	3.81	<0.001

The content of SOD in the blood serum of patients with acne and the control group, depending on the duration of the disease

Note: p is the reliability of the data in relation to the control

*- p >0.05; **- p <0.01; *** - p <0.001;

When studying the SOD content in blood serum, taking into account the severity of acne, it showed that in patients with mild severity, there was a decrease in SOD (126.6 ± 11.1), relative to the control values (201.5 ± 28.6), but the compared figures did not differ statistically significantly (P>0.05). In patients with moderate severity of the disease, the SOD level (102.0 ± 10.8) was reduced and there was a high statistical significance (p<0.001) compared to controls (201.5 ± 28.6). In patients with severe severity, the lowest SOD content (87.0 ± 13.3) in the blood serum was observed, and this value differed from the control group (201.5 ± 28.6) with a high level of statistical significance (p<0.001). It should be emphasized that the lack of statistical differences between indicators of mild severity of the course and healthy individuals can be explained, firstly, by the low severity of the inflammatory process in this course of acne, and secondly, by the compensatory capabilities of the patient's body, i.e. The body responds to the development of the disease by activating its defenses, in particular the antioxidant system. The content of SOD in the blood serum, taking into account the severity of acne, is shown in Table 5.

Table 5

ache							
Investigated	Number	Act of SOD	t	р			
groups	of	in serum blood,					
	patients	conl. units.					
The control group	16	201,5±28,6**	2.9	< 0.001			
Mild severity	31	126,6±11,1*	2.93	< 0.005			
Moderate severity	35	102,0±10,8**	3.99	< 0.001			
Severe severity	17	87,0±13,3**	3.70	< 0.001			

The content of SOD in the blood serum, taking into account the severity of

Note: p is the reliability of the data in relation to the control

*- p >0.05; **- p <0.001;

Thus, in patients with acne, the SOD content in the blood serum is statistically significantly reduced (p<0.001) compared with the control group, as the duration of the disease and the severity of the skin-pathological process lengthen, the level of the studied antioxidant decreases in parallel. The data obtained will allow us to develop a comprehensive method of acne therapy, taking into account the low activity of SOD activity.

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