

Significance of the C-reactive protein and antimicrobial peptide LL-37 in the clinical course in psoriasis patients.

Mavlyanova Sh. Z.

Republican Specialized Scientific and Practical Medical Center of Dermatovenereology and Cosmetology of the Ministry of Health of the Republic of Uzbekistan

Mavlyanova Shakhnoza Zakirovna - Doctor of Medical Sciences, Professor, Republican Specialized Scientific and Practical Medical Center of the Ministry of Health of the Republic of Uzbekistan (RSNPMCDVIC), Tashkent, 100109, Almazar district, Farobi street 3; Head of the Scientific Laboratory for the Study of Dermatoses; ORCID: 0000-0003-2256-5383;

Resume

The article presents clinical (PASI index), immunological (C-reactive protein, antimicrobial peptide LL-37), and microbiological studies in 56 patients with psoriasis. Microbiological studies of lesions in patients with psoriasis revealed high colonization of Staphylococcal flora by *St.aureus* - 64.3 ± 2.5 CFU/cm², exceeding the indicators of healthy individuals by 18.4 times (3.5 ± 0.4 CFU/cm²). ($P < 0.05$). The study results showed that with an increase in the severity of the PASI index, an increase in the level of C-reactive protein and the antimicrobial peptide LL-37 in the blood serum is noted against the background of increased colonization of *staphylococcus* spp. on the skin in patients with psoriasis. A high level of *S. aureus* in lesions and a high level of the antimicrobial peptide LL-37 in patients with psoriasis can be considered a trigger factor, and an increase in the level of CRP in the blood serum of patients with psoriasis plays a key role as a marker of systemic inflammation due to the stimulation of the pro-inflammatory systems.

Keywords: psoriasis, C-reactive protein, antimicrobial peptides LL-37, PASI index, inflammation.

Psoriasis (PS) is a common dermatosis and accounts for 1.2-2.2% of the population, based on immune-genetic mechanisms of development, both systemic and local in nature. Numerous studies have established that in psoriasis, various degrees of severity of the inflammatory component are noted, characterized by the predominance of the local mechanism over the systemic one, which is due to the disruption of the barrier properties of the lesion focus. [3-6]

At the same time, hyperproduction of pro-inflammatory cytokines (in particular, interleukin-1, tumor necrosis factor alpha, IL-6, IL-17) is observed, which contribute to the stimulation of acute phase proteins: C-reactive protein (CRP), complement components, lactoferrin, etc. [8-11,13]

The purpose of our research was to assess the level of C-reactive protein and antimicrobial peptide LL-37 in the peripheral blood of psoriasis patients, taking into account the PASI index.

Research material and methods. 56 patients with psoriasis aged 18 to 65 years were under our observation. Among them, there were 27 women and 29 men. The diagnosis was made according to ICD-X: psoriasis - L.40.0. In terms of clinical form, among 56 patients, the vulgar form was - 34, seborrheic - 14, and psoriatic erythroderma - 8.

All patients underwent clinical (PASI index), immunological, microbiological, and statistical studies. The control group consisted of 22 healthy individuals of the corresponding age. All patients consulted with related specialists: a therapist, an endocrinologist, and others.

Results and their discussion. Considering the clinical course, among 56 patients, 31 (55.4%) had a progressive course and 25 (44.6%) had a stationary course. Taking into account the PASI index assessment, among 56 patients

with psoriasis, a mild degree was diagnosed in 17 (30.4%), a moderate degree in 24 (42.8%), and a severe degree in 15, which constituted 26.8% of cases.

In the gender aspect between men and women in the main and control groups, no significant differences were found in the content of the C-reactive protein and the antimicrobial peptide LL-37. In connection with this, we combined these indicators into a general group.

The results of an ELISA study of the level of C-reactive protein in the blood serum of patients with psoriasis showed that among 56 patients, an increase in the level of CRP was noted in the blood serum of 25 patients, which amounted to 44.6% of cases. In the group of healthy individuals, out of 22 individuals, only one had an elevated CRP level, which constituted 4.5% of cases, indicating the severity of the inflammatory response in the body of psoriasis patients.

Analysis of the quantitative characteristics of the C-reactive protein in blood serum in patients with psoriasis revealed an increase in its level by 3.8 times compared to the indicators of the control healthy group and averaged 6.1 ± 0.4 mg/ml, which was statistically significant. ($P < 0.05$).

Table 1. Indicators of the level of C-reactive protein in the blood serum of patients with psoriasis, taking into account the PASI index ($M+m$)

C-reactive protein (mg/ml)	Healthy group N=22	Light N= 17	Average weight N=24	Severe N= 15
N=56	1,7±0,04	2,9±0,1	3,8±0,2*	7,4±0,4*

Note: * - significance indicator for healthy individuals. ($P < 0.05$)

As can be seen from the table, the concentration of C-reactive protein in the blood serum of patients with psoriasis of mild severity increased by 1.7 times, with moderate severity by 2.2 times, and with severe severity by 4.4 times, respectively. ($p < 0.05$).

The results of an ELISA study of AMP LL-37 in blood serum showed an increase in its concentration in psoriasis patients by 5.3 times compared to the indicators of the control healthy group and averaged 9.6 ± 1.05 pg/ml ($P < 0.05$). We conducted a correlation analysis of the obtained results with the level of CRP and LL-37, taking into account the severity of psoriasis. (Fig.1.)

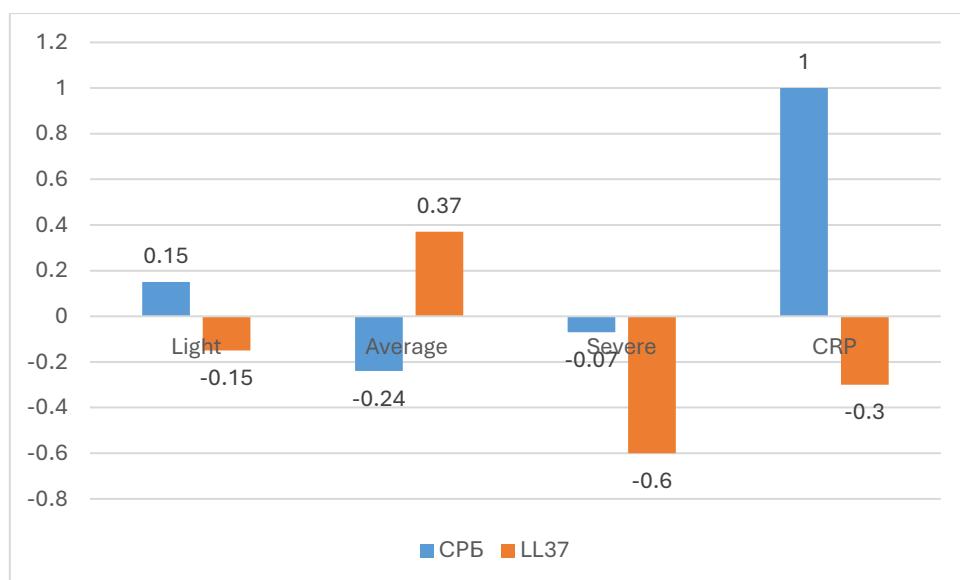


Fig.1. Correlation analysis indicators of CRP and LL-37 in patients with psoriasis, taking into account the PASI index. (r)

The results of the correlation analysis revealed a moderate inverse correlation with the antimicrobial peptide LL-37 in patients with moderate PASI ($r=+0.37$) and a significant inverse correlation in patients with severe PASI ($r=-0.6$). ($P<0.05$)

Microbiological studies of lesions in patients with psoriasis revealed high colonization of Staphylococcal flora *St.aureus* - $64.3+2.5$ CFU/cm², exceeding the indicators of healthy individuals by 18.4 times ($3.5+0.4$ CFU/cm²). ($P<0.05$).

Conclusion:

A high level of *S. aureus* in lesions and a high level of the antimicrobial peptide LL-37 in patients with psoriasis can be considered a trigger factor, and an increase in the level of CRP in the blood serum of patients with psoriasis plays a key role as a marker of systemic inflammation due to the stimulation of the pro-inflammatory systems.

References:

1. Bakhlykova E.A., Filimonkova N.N., Matusevich S.L., Karmatskikh O.G., Zhavyy P.N. The content of the antimicrobial peptide cathelicidin LL-37 and the bacterial profile of the skin in plaque, exudative, and pustular psoriasis. Clinical dermatology and venereology. 2021;20 (1):33-39. <https://doi.org/10.17116/klinderma20212001133>
2. Proteins of the acute phase of inflammation in the blood serum of psoriasis patients.// T.V. Shkolnikova1, V.N. Zorina1, N.G. Korotkiy2, R.M. Zorina1, A.V. Burdina1, I.G. Konyaxina1.- RUSSIAN JOURNAL OF SKIN AND VENEREAL DISEASES.- No6 -2012 - pp. 36-38.
3. Brochet E.A. The state of acute phase proteins and medium-mass molecules in the blood serum of patients with generalized psoriasis folia during the exacerbation and remission of the disease. Experimental and clinical medicine. 2005; 4: 56 - 60.
4. Butov Yu.S., Sukolin G.I., Tumanyan A.G., Vereshchagina V.M., Arkhipenkova A.A. Level of acute phase proteins in blood serum of psoriasis patients. Bulletin of Dermatology and Venereology. 2003; 5: 24 – 7
5. Danilova E.V., Danilova T.G. Clinical significance of blood lactoferrin study in psoriatic arthritis. Fundamental research. 2004; 2: 129.
6. Zorin N.A., Zorina V.N., Zorina R.M. The role of macroglobulin family proteins in the regulation of inflammatory reactions (literature review) Biomedical chemistry. 2006; 3: 229 - 38.
7. Laseev D.I., Timoshkina M.V., Kosolapova T.A., Dikova O.V. Detoxification properties of albumin as a marker of endogenous intoxication in eczema and psoriasis. In the book: Abstracts of the 2nd Scientific and Practical Conference St. Petersburg Dermatological Readings. St. Petersburg; 2008. <http://www.dermatology.ru/collections/detoksikatsionnye-svoistva-albumina-kak-markeraendrogennoi-intoksikatsii-pri-ekzeme-i-p>.
8. Stories by N.I., Ryllova O.S., Dyagtyarev O.V. Proteins of the Acute Phase in Psoriatic Disease. Astrakhan Medical Journal. 2008; 1: 75 - 80.
9. Rakhmatov A.B., Rasulova N.A., Izvekova O.V. Immunological aspects of psoriasis // Dermatovenereology and aesthetic medicine - Tashkent, 2021. - No1-2. - P. 85-89. (14.00.00; No1).
10. Rakhmatov A.B., Rasulova N.A., Khalidova Kh.R. Clinical value of CRP determination in patients with psoriasis // Dermatovenereology and aesthetic medicine - Tashkent, 2022. - No. - P. 90-94. (14.00.00; No1).
11. Rakhmatov A.B., Khalidova Kh.R., Rasulova N.A. The state of cytokine status in patients with psoriasis // Ukrainian Journal of Dermatology and Venereology of Cosmetology, Ukraine, 2020. - No. P. 12-17.
12. Romanova E.L., Shabaldin A.V., Belov E.G., Striga L.V., Yakovleva A.A., Shevchenko E.A., Shabaldina E.V. Gene-gene interactions of cytokines and C-reactive protein in psoriasis in residents of Kemerovo region. Medical immunology. 2025;27 (1):87-96. <https://doi.org/10.15789/1563-0625-GGI-2937>

13. Ruksha T.G., Prokhorenkov V.I., Salmina A.B., Trufanova L.V., Tksanova E.I., Petrova L.L. Keratinocyte apoptosis and expression of peripheral benzodiazepine receptors in psoriasis. *Bulletin of Dermatology and Venereology*. 2004; 5:4-6.
14. Birkenmeier G. Targetting the proteinase inhibitor and immune modulatory function of human alpha 2-macroglobulin. *Mod. Asp. Immunobiol.* 2001; 2: 32—6.
15. Legrand D., Elass E., Carpenter M., Mazurer J. Lactoferrin: a modulator of immune and infl ammatory responses. *Cell. Mol. Life Sci.* 2005; 62(22): 2549—59.
16. Mavlyanova Sh. , Ismogilov A., a Mahsudov M. P27 The state of the skin microbiome in patients with psoriasis//https://academic.oup.com/bjd/article/191/Supplement_3/ljae360.057/7916193 by guest on 09 April 2025
17. Nakamizo S, Egawa G, Honda T, Nakajima S, Belkaid Y, Kabashima K. Commensal bacteria and cutaneous immunity. *Semin Immunopathology*. 2014;37(1):73-80. <https://doi.org/10.1007/s00281-014-0452-6>
18. Witte M, Thaçi D. Psoriasis und Mikrobiom. *Hautarzt*. 2019;70:416-421. <https://doi.org/10.1007/s00105-019-4415-7>
19. Yan D, Issa N, Afifi L, et al. The Role of the Skin and Gut Microbiome in Psoriatic Disease. *Curr Derm Rep*. 2017;6:94-103. <https://doi.org/10.1007/s13671-017-0178-5>