

CLINICAL AND MORPHOLOGICAL CHARACTERISTICS OF ATOPIC DERMATITIS, WITH CONSIDERING THE SKIN MICROBIOTA.

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The purpose of the work is to evaluate the pathomorphological picture of the skin, taking into account the microbiota of the skin in patients with atopic dermatitis.

Material research methods. 157 patients with atopic dermatitis were examined, all patients underwent clinical, microbiological, histological and statistical studies.

Results of the study: clinical, microbiological and histological studies of skin biopsy specimens in patients with atopic dermatitis showed that against the background of increased contamination of the opportunistic flora of staphylococcus spp. pronounced changes in the pathomorphological picture are noted, which characterizes the severity of infiltrative-inflammatory processes of the skin.

Conclusions: In patients with AD with colonization of st.aureus and St. Haemoliticus, there is a pronounced change in the pathomorphological picture with a predominance of spongiosis, infiltration and swelling of the dermis, while with the colonization of St. Saprophyticus, there is a predominance of acanthosis with a mild degree of spongiosis and infiltration, and during the colonization of St. Epidermidis, there is a weak severity of pathomorphological parameters.

Key words: *atopic dermatitis, skin microbiota, Staphylococcus spp., skin pathomorphology.*

In recent years, researchers have paid special attention to the role of opportunistic microorganisms of the microbial and fungal flora of the skin in the pathogenesis of atopic dermatitis (AD). [1,4,5] Their participation in the pathogenesis of the disease was established by induction of allergen-specific IgE, development of sensitization and additional activation of dermal lymphocytes. At the same time, long-term colonization and their persistence in the biosubstrates of the body in patients with atopic dermatitis contributes to the development of sensitization of the body. [3,6,9] Among bacterial agents, great importance is attached to the staphylococcal flora, and in particular Staphylococcus aureus, which is found in 80-90% of cases on the skin of patients with atopic dermatitis without signs of a purulent process. [2,4,5]

Thus, Staphylococcus aureus in a high density of colonization was detected in 93% of patients with AD on the affected skin, in 76% of patients on skin free from rashes, and in 79% of patients on the mucous membrane of the upper respiratory tract. According to the literature data, the expressed sensitization of the organism of patients to antigens of Staph. aureus can be explained by the high virulence of the cell wall of microorganisms, as well as the production of a number of toxins that cause the development of allergic reactions of delayed and immediate hypersensitivity in the macroorganism. [5,8]

Many researchers, without denying the importance of the hereditary factor, neuroimmune and other systemic disorders, nevertheless attach great importance to the relationship of allergic diseases with violations of the microecological balance of the body. [1,3,5,8,9] From this point of view, dermatoses are of

great interest, since the role of microorganisms persisting on the skin as infectious and allergic factors involved in the formation of the disease has not yet been sufficiently determined. [4,7]

Purpose of work: to evaluate the pathomorphological picture of the skin, taking into account the microbiota of the skin in patients with atopic dermatitis.

Material and research methods. We examined 157 patients with different clinical forms of atopic dermatitis. The age of patients ranged from 1 to 59 years, including 85 men (54.1%), women 72 (45.9%). Basically, these were patients with a moderate course of the disease - 65%, a mild course was noted in 12% of cases, and a severe one - in 23%.

All patients underwent clinical (definition of the SCORAD index), immunological, microbiological, histological and statistical studies.

For morphological studies, biopsies were fixed in 10% neutral formalin (pH-7.3), isopropyl wired, compacted in xylene-paraffin porridge, and embedded in paraffin blocks. Sections of 3-4 microns thick were made on a microtome, applied to glass slides with an adhesive coating, and deparaffinized. Sections were stained with hematoxylin and eosin. Microscopic studies were carried out using an Eclipse E200 light microscope manufactured by Nikon (Japan) at x180 and x400 magnifications.

Microbiological studies were performed on 97 patients with clinical signs of AD and likely visibly altered skin by scraping followed by culture. For cultural studies, we used 5% blood agar, Endo's medium, Kligler's, as well as saline agar with the addition of mannitol, and incubation was carried out in a thermostat at 36.8 ° C. Microbiological studies and skin biopsies were performed in patients with AD before the use of topical and / or systemic glucocorticosteroids and antibacterial external means.

Statistical processing of the results was carried out using the Statistika V.55A program using the Shapiro-Wilk test (2006).

Research results. According to the clinical form, among 157 patients, 54 (34.4%) were diagnosed with erythematous-squamous form, 41 (26.1%) - erythematous-squamous form with lichenification, 15 (9.5%) - lichenoid, 13 (8, 2%) - the exudative form and 39 (24.8%) - noted the pruriginous form. According to the SCORAD index, 20.5% had a mild degree, 52.3% had an average degree, and 27.3% had a severe degree.

Microbiological studies of the skin of 157 patients with AD showed that gram+ chemoorganotropic facultative anaerobic bacteria from the Micrococcaceae family - *Staphylococcus* spp. were sown in 124, which accounted for 78.9% of cases.

According to the species identification of *Staphylococcus* spp., *St. Aureus* - 54.03% (67 out of 127), *St. saprophyticus* - in 25.8% (32), *st. haemolyticus* - in 12 patients, which accounted for 9.7% of cases. Whereas the sowing rate of the facultative flora *st. Epidermidis* was noted in 10.5% of cases (in 13).

Table 1. The nature of the colonization of *Staphylococcus* spp. in examined patients (CFU/cm²)

Group	<i>St. aureus</i>	<i>St. epidermidis</i>	<i>St. saprophyticus</i>	<i>St. Haemolyticus</i>
Patients AD N=124	96,3±0,8*	51,2±0,9*	46,1±1,4	48,2±0,4
Control group,N=72	3	6,6±0,4		

Note: * - reliability indicator in relation to the indicators of healthy individuals (P < 0.05)

As can be seen from the table, in the examined patients, increased colonization of staphylococcal flora was noted on the skin of lesions, which statistically significantly differed from the indicators of control healthy individuals (P < 0.05).

Analysis of the obtained results indicates that in patients on the skin of lesions during an exacerbation of the disease, there is an increased colonization of opportunistic microorganisms, which can be one of the

provoking factors in the development of not only exacerbations, but also complications of the main skin process secondary infection.

Analysis of the correlation between the degree of colonization and the severity of the clinical course of diseases was variable.

So the results of the study showed that with a mild degree of severity, the contamination of *St. aureus* had a statistical correlation $r= +0.5$ in patients with atopic dermatitis ($P<0.05$), *St. Saprophyticus* - in the group of patients with AD ($r=+0.4$, $P<0.05$), *St. Haemoliticus* - direct correlation with blood pressure - $r=+0.4$ ($P<0.05$).

Whereas with moderate severity of dermatosis, in the group of patients with AD, *St. aureus* - $r=+0.3$, *St. saprophyticus* – $r=+0.5$ ($P<0.05$).

So the results of the study showed that with a mild degree of severity, the contamination of *St. aureus* had a statistical correlation $r= +0.5$ in patients with atopic dermatitis ($P<0.05$), *St. Saprophyticus* - $r=+0.4$. *St. Haemoliticus* - direct correlation with blood pressure - $r=+0.4$ ($P<0.05$).

With severe severity in patients with AD, it showed a significant correlation with *St. Aureus* and *St. saprophyticus* – $r=+0.4$ ($P<0.05$) , *St. Haemoliticus* – $r=+0.5$ and *St. epidermidis* – $r=+0.3$ ($P<0.05$), respectively.

In a morphological study of the skin, changes in the epidermis and dermis were assessed by the severity of pathological processes such as acanthosis, spongiosis of spiny layer cells, dermal edema, infiltration and infiltration composition (neutrophils, eosinophils) (Table 2).

Table 2. The severity of pathological changes in the skin in patients with AD, taking into account the inoculated microflora.

microflora	acanthosis	spongiosis	infiltration	eosinophilia	Edema of the dermis
St. Aureus	++	+++	+++	++	+++
St. Saprophyticus	++	++	+	-/+	+
St. Haemoliticus	++	+++	++	+	++
St. Epidermidis	++	+	+	-/+	+

Note: "+" is less pronounced, "++" is pronounced, "+++" is a strongly pronounced process

In studies in patients, sown *St. Aureus* in AD, the morphological picture is diverse due to different clinical forms of AD (erythematous-squamous, erythematous-squamous form with lichenification, lichenoid, exudative, pruriginous). The general picture observed in the preparations: hyperkeratosis, serous fluid in the stratum corneum containing neutrophils, sometimes bacterial colonies, thickening of the granular layer, uneven acanthosis with elongated epidermal processes, more pronounced intercellular edema of the spinous layer cells, vacuolization of the cells of the basal layer. In the papillary layer of the dermis, edema was observed, vasodilation, around them lymphohistiocytic infiltration with neutrophil content, from single to focal accumulation of eosinophils. In some sections in the papillary dermis, there was a pronounced edema, a

pronounced inflammatory pattern: the infiltration consisted mainly of neutrophils and eosinophils, the skin appendages were involved in the pathological process (Fig. 2).

Conducted histological studies in patients with AD inoculated *St. Haemolyticus* is usually somewhat similar in histology to *St. Aureus*, but less pronounced: slight hyperkeratosis in the epidermis, sometimes focal parakeratosis; hypergranulosis in the granular layer. In some preparations, vacuolar dystrophy of the cells of the basal layer was found. In the dermis, less pronounced edema with swollen collagen fibers. It was also noted the expansion of the capillaries, around them was determined from moderate to severe lymphohistiocytic infiltrates containing neutrophils and sometimes single eosinophils. Skin appendages are usually not involved in the pathological process.

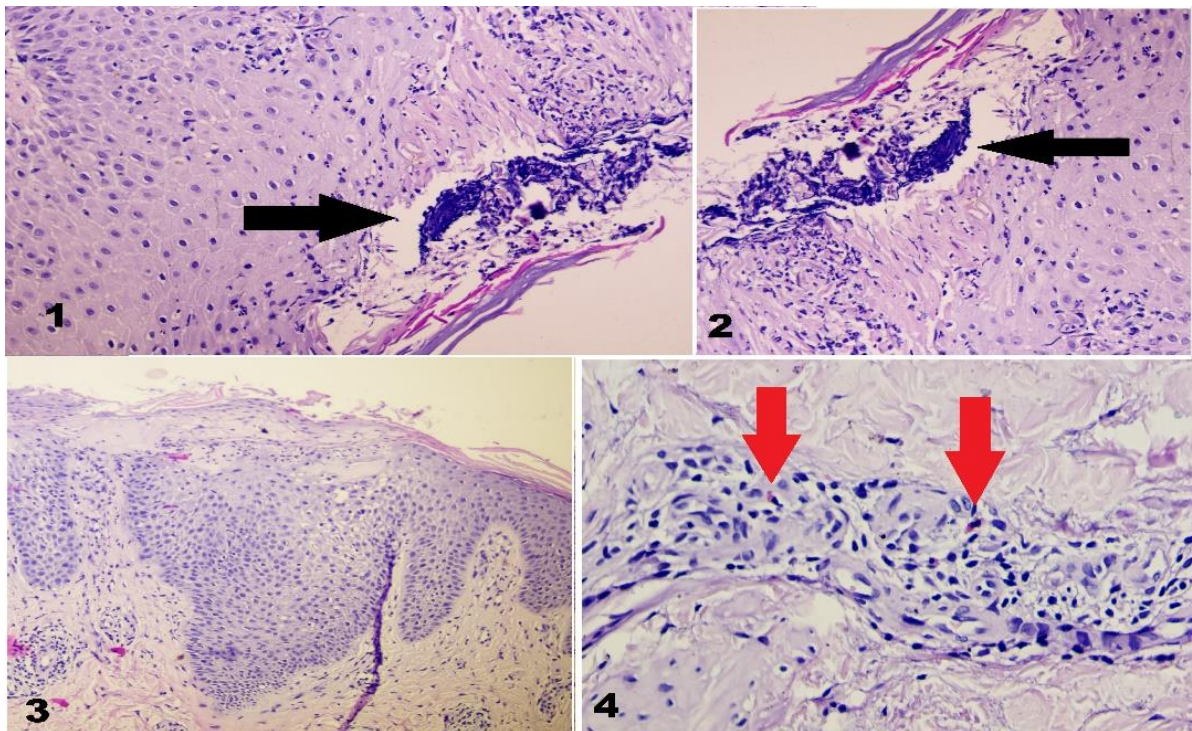


Fig.1. Pathomorphological picture of the skin in a patient with AD from a seeded culture of *St. aureus*: 1-2 colonies of bacteria and neutrophils in the stratum corneum of the epidermis. 3-expressed spongiosis of cells of the spiny layer, acanthosis, the presence of inflame in the dermis around the capillary; 4-eosinophils.

Conducted histological studies in patients with AD inoculated *St. Saprophyticus*, *St. Epidermidis* showed that in the epidermis there is a slight ortho- and hyperkeratosis, focal parakeratosis; uneven acanthosis and intercellular edema of the cells of the prickly layer of the epidermis. In the dermis, the pathology was manifested by moderate edema. In the upper and middle thirds of the dermis, expansion of dermal capillaries was noted, around them moderate lymphohistiocytic infiltrates were determined with the content of neutrophils and sometimes single eosinophils (Fig. 3). Skin appendages are usually not involved in the pathological process.

Conclusions:

In patients with AD with colonization of *st.aureus* and *St. Haemolyticus*, there is a pronounced change in the pathomorphological picture with a predominance of spongiosis, infiltration and swelling of the dermis, while with the colonization of *St. Saprophyticus*, there is a predominance of acanthosis with a mild degree of

spongiosis and infiltration, and during the colonization of *St. Epidermidis*, there is a weak severity of pathomorphological parameters.

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