

## The Role of Immune Disorders in Development of Skin Demodecosis

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### ABSTRACT

According to the modern data a skin is considered as a compound part of immune system, that is why processes which take place in the epidermis and derma are reflected on common immune response of constitution. Demodecosis is a chronic disease; predominantly it tends to affect facial skin and is caused by cutaneous infection with the mite-demodex folliculorum. Immunological parameters were studied in 20 patients with skin demodecosis. From them 14 were females and 6 males at the ages from twenty to sixty. Duration of course was 1-4 years. According to the received data it was established, that patients with skin demodecosis have serious depression of both - systemic and local immune parameters. They have low level of several immunological parameters: T- lymphocytes (T- helper, T- suppressors), index of phagocytosis, especially alpha and a interferon. Depression of immune homeostasis is parameters was observed, with correlation to hardness of process.

**KEYWORDS:** *skin demodecosis, demodex folliculorum, immune homeostasis*

**D**emodecosis is a chronic disease; predominantly it tends to affect facial skin (in particular eruption: papules and pustules occur on cheeks, forehead, chin and nose area) and is caused by cutaneous infection with the mite-demodex folliculorum. Parasite is inhabitant of hair follicles and sebaceous glands (*Demodex brevis*).

It is established that cutaneous infection with the mite promotes cellular and humoral immune disorders. At the same time immune response reactions depend on the character and stage of the mite invasion. In its different stages of development of mite can express various antigens, which promote diverse immune reactions. Parasite is covered with thick membrane protecting it from influence of toxic products, formed in process of metabolism [1].

It is well known that for mite's normal development it needs cell protein, which it takes from epithelial cells. During digestion of sebaceous glands secret, parasite produces lipase - it can hydrolyze Lipids into triglycerids, releases lipid acids, which have irritant effect. Parallel superficial lipid quantity is changed and it is followed by change of bacterial flora with secondary infection of Hair-hair follicles. The mite can assimilate and transfer bacteria to healthy skin; it can also get into deep layer of cutaneous and bring pathogen cocas there that assist possibility to develop inflammatory suppurative-necrosis process [4, 5].

Property of skin damage in demodecosis depends on variety factors, among them are: conditions of constitution and immune system, metabolic and digestion disorders and etc.

It is worthy of note that demodex follicular can be found in majority of people but most of them only carry parasite and disease does not appear. Clinically asymptomatic forms' conversion in disease is connected with deficiency of immunity (primary or secondary). It is known that the risk of development of demodecosis is higher in people and animals with delicate immune system [2, 3].

All stated above assured us in necessity to study conditions of immune system in persons with skin demodecosis. We have determined several immunological parameters, which gave us complete information about the role of immune disorders in pathogenesis of demodecosis.

We have investigated 20 patients. Presence of mite was established by laboratory research. From them 14 were females and 6 males at the ages from twenty to sixty. Duration of course was 1-4 years.

Immunological analyze was fulfilled to define the following parameters: B-lymphocytes percentage and quantity immunoglobulins in three classes (G, A and M) in blood, T - lymphocytes and their subpopulations (active, helper and suppression, index of immunoregulation) percent, three markers of phagocytosis (number, index and the complete), also interferon's system  $\alpha$  and  $\gamma$  types.

Quantity of T - lymphocytes in blood was defined by the method of spontaneous E-rosette formation with erythrocytes of the ram. We used micro method which allowed us to count - T and B lymphocytes in blood taken from finger; quantity of three main classes of immunoglobulins (IgG, IgA and IgM) in blood was defined by the method of radial immunodiffusion in the gel. Production of interferon by leukocytes in vitro was defined by the method of B. D. Soloviov and T. A. Bektemirov. In order to receive  $\gamma$  -interferon, instead of virus leukocytes were treated with koncanavalin - A. For estimation of phagocytosis three main indexes were marked: phagocyte's number, index and the completion of phagocytosis.

According to the received data it was established, that patients with skin demodecosis have serious depression of both - systemic and local immune parameters percent of T - helper (33,0%) and T - suppressors were fallen, on the contrary index of immune regulation was increased 2,5 (in the control - 2,35). Also quantity of active fractions (20,3%) of T - lymphocytes was certainly decreased.

There were serious disorders in phagocyte system. Common number of neutrophils was fallen to 61,9%, engulf ability - to 2,8%, digestion activity - to 55,2%.

The main mediators of immune response were sharply decreased  $\alpha$  interferon (16,2 unit/ml) and  $\gamma$ - interferon (4,0 unit/ml) activity in leukocytes.

During our research direct correlation with immune disorders and hardness of process was fixed, which is intensely reflected on activity of interferon and decreased phagocyte-digest ability of neutrophils. Such intense changes were characteristic for average and severe forms of disease. In case of less clinical features, changes of the

following immune parameters were unimportant (except  $\alpha$  and  $\gamma$  interferon).

As we can see, the disease appearance is promoted by low ability of leukocytes to produce interferon.  $\alpha$  - interferon has important role in natural immunity (to remit clinical features) so  $\gamma$  interferon has direct significance to turn chronic forms into acute. If quantity of interferon is low, disease appears more severely.

So, our study clearly shows immune disorders in patients with skin demodecosis. They have low level of several immunological parameters: T lymphocytes, index of phagocytosis, especially  $\alpha$  and  $\gamma$  interferon.

The fact that important role in pathogenesis of demodecosis belongs to immune disorders, must be taken into account to work out new methods of complex therapy for this disease.

T	T-a	T-h	T-s	Ii	B	IgG	IgA	IgM	FN	FI	FC	aIF	gIF
46.0	20.3	33.0	13.0	2.5	22.8	13.5	1.48	0.91	61.9	2.8	55.2	16.2	4.0
51.5	29.5	36.1	15.3	2.35	26.3	11.2	1.73	1.21	75.6	6.3	71.4	41.3	28.6

**Tab.1** Influence of skin demodecosis on immunological indices of patients..

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## Роль иммунных нарушений в патогенезе демодекоза кожи

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### РЕЗЮМЕ

По современным данным кожа рассматривается как составная часть иммунной системы и, поэтому, патологические процессы, протекающие в коже, отражаются на общем иммунном ответе организма. Демодекоз является хроническим заболеванием, преимущественно поражающим кожу лица и развивающимся в результате инфицирования кожи клещами - *Demodex folliculorum*. Изучены показатели иммунной системы у 20 больных с демодекозом кожи - из них 14 женщин и 6 мужчин в возрасте от 20 до 60 лет. Продолжительность заболевания - от одного года до четырех лет. Установлено, что у больных демодекозом отмечаются отчетливые изменения общих и локальных иммунных параметров: Выявлены низкий уровень: Т-лимфоцитов (Т-хелперов и Т-супрессоров), индекса фагоцитоза, особенно альфа- и гамма- интерферонов, а также угнетение показателей иммунного гомеостаза, коррелирующее с тяжестью процесса.

**КЛЮЧЕВЫЕ СЛОВА:** демодекоз, *demodex folliculorum*, иммунный гомеостаз