

CHARACTERISTICS OF CERTAIN MICROELEMENTS IN PSORIASIS AND VITILIGO**G. U. Zhanabaeva^{*1,3}, Z. I. Akhmed Zhanova², R. I. Turimbetova¹, R. K. Aytazarova¹**¹Medical Institute of Karakalpakstan.²Institute of Immunology and Human Genomics, Academy of Sciences of the Republic of Uzbekistan.³Karakalpak Branch of the Republican Specialized Scientific and Practical Medical Center of Dermatovenerology and Cosmetology.***Corresponding Author: G. U. Zhanabaeva**

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ABSTRACT

The article provides an overview of the biological role of essential elements, including their important function in implementing adaptation mechanisms in various climatic conditions, particularly in the Aral Sea region, where the human body experiences adverse effects of natural and anthropogenic factors. It has been established that the condition of the skin, which determines the ability of the body to function normally under changing environmental conditions, largely depends on the body's supply of micro- and macroelements, while the manifestation of an excess or deficiency of vital microelements can be a pathognomonic symptom of these disorders.

KEYWORDS: essential microelements, zinc, copper, manganese, chromium, selenium, vitiligo, psoriasis.

Vitiligo and psoriasis are common chronic skin diseases that are inherited. Both are considered autoimmune because their development is associated with disruptions in the same biochemical processes as other autoimmune diseases. The difference between them lies in the damage to different skin cells and, accordingly, in the manifestation of symptoms. In psoriasis, there is accelerated proliferation of epidermal cells (the outer layer of the skin) — keratinocytes. This leads to skin thickening and the formation of characteristic plaques. Vitiligo manifests as skin depigmentation, with the immune system attacking melanocytes - cells responsible for producing melanin, a pigment that determines skin color. The destruction of melanocytes leads to the appearance of white spots on the skin of various shapes and sizes. Thus, psoriasis and vitiligo are autoimmune diseases with a genetic predisposition. They affect different skin cells and manifest in completely different ways: psoriasis through skin thickening and inflammation, and vitiligo through the discoloration of certain areas of the skin.

Although the relationship between these two diseases is not sufficiently known, they have many common immunological signaling pathways, including Th1 and

Th17 pathways and alterations in regulatory T-cells (Treg). At the genetic level, both diseases are associated with NALP1 gene polymorphism. Moreover, there are clinical and pathological similarities such as skin lesions, neuropeptide involvement, absence of organ-specific autoantibodies, positive family history of cardiovascular diseases, and the Koebner phenomenon. Recognizing this connection may lead to a better understanding of the etiology, pathogenesis, and treatment of these diseases.^[2,4,6]

Currently, increasing attention is being paid to studying the role of microelements in human life. Assessing a person's elemental status is a key factor in determining how deficiencies, excesses, or disruptions in the tissue distribution of micro- and macroelements affect human health.^[3]

The content of microelements in hair reflects the microelement status of the body, and disturbances in electrolyte homeostasis play a significant role in aggravating the psoriatic process. The body's adaptive and compensatory responses are supported by specific concentrations of microelements, and disruptions in these

levels lead to the disorganization of physiological processes.

Aim of the study

To study the characteristics of certain microelements in patients with vitiligo and psoriasis.

MATERIALS AND METHODS

We examined 108 patients with psoriasis and vitiligo, aged 18 to 65, who were undergoing treatment at the Karakalpak branch of the Republican Specialized Scientific and Practical Center of Dermatovenerology and Cosmetology. All patients provided voluntary written consent for diagnostic procedures in accordance with the Helsinki Declaration.

All patients underwent clinical and laboratory tests (complete blood count, enzymes, bilirubin, blood glucose). Research on hair microelements (Zn, Fe, Cu, I, Mn, Se, Cr, Co) was conducted at the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan using the neutron activation method.

RESEARCH RESULTS

Analysis of gender distribution showed that among patients with psoriasis, the number of women — 46 (62%) — was higher than the number of men — 28 (38%). Among patients with vitiligo, the number of men — 28 (64%) — was higher than the number of women — 16 (36%).

Clinical findings revealed that among patients living in the Aral Sea region, the total number of vitiligo cases was 44. The acrofacial form was found in 20 patients (45%), the segmental form in 14 (32%), the focal form in 5 (11%), the vulgar form in 3 (7%), and Setton's disease in 2 patients (5%).

The total number of patients showed the vulgar form in 89% of cases, the palmoplantar form in 11%, psoriatic arthritis in 12%, and erythroderma in 8% of the examined patients. Most patients were diagnosed with the progressive stage of psoriasis (85% of cases), while the stationary stage was identified in 15% of cases.

Total number of vitiligo patients 44. Acrofacial form - 20 patients (45%), segmental form - 14 (32%), focal form - 5 (11%), vulgar form -3 (7%), Seton's disease -2 (5%).

Analysis of essential microelements — Zn, Fe, Cu, I, Mn, Se, Cr, and Co — revealed that among the patients we examined with vitiligo and psoriasis, the frequency of abnormalities in the mineral composition of hair showed certain differences.

In our study of patients with psoriasis and vitiligo living in the Aral Sea region, as shown in the data presented in the table, the content of essential microelements (Zn, Fe, Cu, I, Mn, Se, Cr, Co) showed the following changes: a

significant decrease in Cr and Cu levels was observed in both psoriasis and vitiligo. The greatest decrease in Cu, by twofold, was found in psoriasis patients ($7.597 \pm 0.263 \mu\text{g/g}$), although, according to the literature, copper plays the main role in the pathogenesis of vitiligo. Chromium deficiency in adults contributes to the development of atherosclerosis, which is related to its role in lipid oxidation. Chromium is also known to have the ability to migrate within the organs of the mononuclear phagocyte system.

Analysis of manganese levels showed that its content was within the normal range in the overall group of patients with psoriasis, with a slight increase observed in vitiligo patients ($1.463 \pm 0.543 \mu\text{g/g}$). Manganese is important for the activity of metabolic processes, bone health, and the formation of connective tissues. By regulating hematopoiesis, manganese also participates in interferon synthesis. Its most important property is helping protect the body from free radical damage and enhancing the synthesis of thyroid hormones.^[1]

In our study, the levels of iron and zinc in patients with psoriasis and vitiligo were within the normal range. Iron absorption is influenced by the intake of phosphates, oxalates, calcium, zinc, and vitamins.

Zinc is one of the main metalloenzymes, and its deficiency disrupts antibody synthesis. At the same time, microelements such as copper, cadmium, and lead, in the context of protein deficiency, can also lead to zinc deficiency. The absorption of zinc can be influenced by manganese, iron, calcium, cadmium, and vitamins A and B6.^[5]

According to the literature, selenium is associated with the functioning of major body systems, including the immune, nervous, and cardiovascular systems. Even a slight selenium deficiency can affect thyroid and reproductive functions.^[7] In our patients, selenium levels were within the normal range for both psoriasis and vitiligo patients (Table 1).

An increase in iodine content was observed in psoriasis patients ($1.747 \pm 0.74 \mu\text{g/g}$), whereas in vitiligo patients ($1.033 \pm 0.203 \mu\text{g/g}$), it remained within the reference values. At high concentrations, iodine is toxic and can lead to thyroid pathology, as well as skin and respiratory disorders.

CONCLUSION

In patients with vitiligo and psoriasis living in the Aral Sea region, specific changes in the content of certain essential microelements in hair are observed, likely due to a combination of genetic and environmental factors characteristic of this region. Moreover, these findings highlight the need to develop fundamentally new approaches to the prevention and treatment of psoriasis. In particular, the data suggest the possible existence of previously unknown factors influencing the onset and

progression of the disease, which could serve as a basis for creating more effective treatment methods and strategies to prevent disease development.

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