IMMUNOLOGICAL FEATURES AND CYTOKINE PROFILE IN SYSTEMIC SCLEROSIS AND THEIR CLINICAL SIGNIFICANCE

Buranova S.N.

Tashkent State Medical University, Tashkent, Uzbekistan

Abstract

Systemic sclerosis is a chronic autoimmune disease characterized by fibrosis, microvascular damage, and immune dysregulation. The aim of the study was to investigate immune status parameters and cytokine profiles in patients with systemic sclerosis and to assess their association with the clinical course of the disease. The study included 20 patients with a confirmed diagnosis. Cellular and humoral immunity parameters, autoantibodies, and serum cytokine levels were analyzed. The results demonstrated that immune imbalance and cytokine dysregulation play a significant role in the development and progression of the disease. The findings support the importance of early immunological assessment for predicting disease course.

Keywords

systemic sclerosis, immune status, cytokines, IL-6, TNF-α, TGF-β, fibrosis, autoantibodies, clinical course

Introduction. Systemic sclerosis is a complex autoimmune connective tissue disease characterized by excessive collagen deposition, vascular involvement, and pronounced immune disturbances. Despite considerable advances in understanding the pathogenesis of the disease, early diagnosis and prevention of progression remain challenging. In recent years, particular attention has been paid to the role of immune dysfunction, including cytokine imbalance and altered activity of immune cells. Identification of these changes at early stages may contribute to improved diagnosis and prognosis.

Materials and Methods. The study included 20 patients with systemic sclerosis diagnosed according to established clinical and immunological criteria. All participants provided informed consent. The assessment of immune status involved evaluation of cellular immunity, including T-lymphocytes and their subpopulations (CD4+, CD8+), as well as analysis of humoral immunity indicators such as immunoglobulins IgG, IgM, and IgA. In addition, autoantibodies were detected, including antinuclear antibodies (ANA), anticentromere antibodies, and

anti-Scl-70. Cytokine profiling was performed by measuring serum levels of pro-inflammatory cytokines (IL-6, TNF-α, IL-1β), the anti-inflammatory cytokine IL-10, and the profibrotic cytokine TGF-β. Clinical evaluation included assessment of skin involvement using the modified Rodnan skin score, identification of Raynaud's phenomenon, evaluation of internal organ involvement including lungs, heart, and gastrointestinal tract, as well as analysis of disease duration and activity. Statistical analysis was carried out using standard methods, and correlation analysis was performed to determine relationships between immunological parameters, cytokine levels, and clinical manifestations.

Results. Significant alterations in immune status were identified in patients. A decrease in the CD4+/CD8+ ratio was observed, indicating impaired cellular immunity. Elevated levels of immunoglobulins, particularly IgG, reflected activation of the humoral immune response. Autoantibodies, including ANA and anti-Scl-70, were detected in the majority of patients. Cytokine analysis revealed increased levels of pro-inflammatory cytokines IL-6 and TNF-α. Elevated TGF-β levels were associated with pronounced skin fibrosis. Reduced IL-10 levels indicated insufficient anti-inflammatory regulation. A clear relationship between immunological parameters and clinical course was established. Higher levels of IL-6 and TNF-α were associated with increased disease activity and internal organ involvement. TGF-β levels showed a positive correlation with the severity of skin involvement. Patients with more pronounced immune disturbances demonstrated a more aggressive disease course.

Discussion. The obtained results confirm the important role of immune dysregulation and cytokine imbalance in the pathogenesis of systemic sclerosis. Increased levels of pro-inflammatory and profibrotic cytokines indicate their involvement in the development of fibrosis and disease progression. The identified correlations between immunological markers and clinical manifestations emphasize the importance of comprehensive immune status assessment. It can be assumed that immunological alterations may precede clinical manifestations, making them potential markers for early diagnosis.

Conclusion. Immune status disturbances play a key role in the development of systemic sclerosis. Cytokine dysregulation, particularly increased levels of IL-6, TNF-α, and TGF-β, is closely associated with disease severity and progression. Early assessment of immunological parameters may have diagnostic and prognostic value. Monitoring immune status and cytokine profiles may contribute to optimization of patient management.

REFERENCES:

1. Akhmedov, K., Abdurakhmanova, N., & Buranova, S. (2023). Features of the clinical course of rheumatoid spice against the background of the influence of xenobiotics. American Journal of Interdisciplinary Research and Development, 12, 142-147.

2. Axmedov, I. A., Xalmetova, F. I., & Zaripov, S. I. (2024). Rematoid artrit kasalligi bo 'lgan bemorlarda yurak qon-tomir tizimidagi buzulishlarni erta aniqlashda yurak ritmi buzilishlarining o 'rni.

3. Buranova, S. (2021). Method of treatment aimed at the dynamics of cartilage oligomer matrix protein (COMP) in patients with osteoarthritis.

4. Khalmetova, F. I., Akhmedov, K. S., Buranova, S. N., Rakhimova, M. B., Rakhimov, S. S., & Abdurakhimova, L. A. (2023). Immunological Features of Reactive Arthritis of Various Etiologies. Journal of Coastal Life Medicine, 11, 1322-1325.

5. Rakhimova, M. B., Akhmedov, K. S., & Turaev, Y. A. (2021). Endothelial dysfunction as a link in the pathogenesis of ankylosing spondylitis against the background of a new coronavirus infection. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 2493-2498.

6. Абдурахимов, А. Г., & Халметова, Ф. И. (2023). Нестероидные противовоспалительные препараты у пациентов с деформирующим остеоартрозом и артериальной гипертензией: анализ влияния целекоксиба и мелоксикама на антигипертензивные средства. Оптимизация лечения. Атеросклероз, 19(3), 186-187.

7. Рахимова, М. Б., Ахмедов, Х. С., & Халметова, Ф. И. (2025). ОЦЕНКА ЭНДОТЕЛИАЛЬНОЙ ДИСФУНКЦИИ У БОЛЬНЫХ РЕВМАТОИДНЫМ АРТРИТОМ.

8. Рахимова, М., Ахмедов, К., Буранова, С., и Турсунова, Л. (2022). Оценка сердечно-сосудистых событий у пациентов с анкилозирующим спондилитом после COVID-19.

9. Шовкатова, М. Н., & Рахимова, М. Б. (2025). ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В ЦИФРОВОЙ СТРАТИФИКАЦИИ И ДИНАМИЧЕСКОМ КОНТРОЛЕ СЕРДЕЧНО-СОСУДИСТОГО РИСКА У БОЛЬНЫХ С АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИЕЙ И РЕВМАТОИДНЫМ АРТРИТОМ. FARS International Journal of Education, Social Science & Humanities., 13(12), 7-14.