



## CHANGES IN IMMUNOLOGICAL INDICATORS IN PATIENTS WITH CHRONIC TONSILLITIS

*Esonova Orzigul Shamshiddinovna* Teacher of the Clinical Department of  
the Faculty of Medicine,  
Namangan State University *Abdurakhmonov Khasan Bakhodir o'g'li* 4th-  
year student of the General medicine department

**Abstract:** *Chronic tonsillitis is recognized as a prevalent pathology within the sphere of otorhinolaryngology, significantly affecting both children and adults. The palatine tonsils, as integral components of the Waldeyer's ring, play a vital role in local and systemic immunity. Chronic inflammation of these tonsils not only diminishes their defense capacity but also evokes significant shifts within the human immune system, altering both humoral and cellular immunologic indicators.*

**Key words:** *chronic tonsillitis, immunological indicators, humoral immunity, cellular immunity, immunoglobulins, cytokines, T-lymphocytes, immune dysregulation, tonsil inflammation, immune response.*

Chronic tonsillitis is typically characterized by persistent infection and inflammation of the lymphoid tissues located in the oropharynx. The pathogenesis of the disease involves the complex interaction between pathogenic microorganisms, local microflora, and the host's immune response. Initially, immune cells in the tonsillar tissue react actively to invading pathogens, producing immunoglobulins and cytokines. As the inflammation becomes chronic, however, the immunological dynamics undergo marked changes, often leading to immune dysregulation. One observable alteration in patients with chronic tonsillitis is the shift in humoral immunity, particularly concerning immunoglobulin concentrations. Studies have demonstrated that serum and local levels of Immunoglobulin A (IgA), Immunoglobulin G (IgG), and Immunoglobulin M (IgM) can be significantly altered in these patients. For example, the salivary and serum IgA levels are often decreased,



which compromises the mucosal barrier and lowers the resistance to recurrent infections. Meanwhile, IgG and IgM levels may fluctuate, sometimes showing compensatory increases due to persistent antigenic stimulation but in other cases being suppressed, reflecting underlying immune exhaustion. Cellular immunity is also profoundly affected in chronic tonsillitis. T-lymphocyte populations, particularly helper T-cells (CD4+) and cytotoxic T-cells (CD8+), are frequently analyzed to assess immune function. Research findings indicate that the ratio of CD4+ to CD8+ cells may be disturbed in people with chronic tonsillitis. Typically, a decrease in CD4+ cells and an increase in CD8+ cells are found, indicating a suppressive effect on the immune system's regulatory mechanisms. Natural killer (NK) cell activity can also be diminished, further weakening cellular immunity and predisposing the patient to persistent and recurrent infections [1].

Another prominent aspect of immune indicator alteration involves the production and function of cytokines. Cytokines such as interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF- $\alpha$ ) are abundantly expressed during acute inflammation, but chronic disease is often associated with sustained, dysregulated cytokine production. In chronic tonsillitis, elevated proinflammatory cytokines perpetuate local tissue damage and promote the persistence of the inflammatory process. Simultaneously, anti-inflammatory cytokines such as IL-10 may be insufficiently produced, resulting in failed resolution of inflammation. In investigating immunological parameters, immunophenotyping is a valuable method for evaluating the state of the immune system in chronic tonsillitis patients. Deviations in the absolute and relative numbers of B-lymphocytes, reductions in memory B-cell populations, and altered antibody synthesis capacity are commonly discovered. These abnormalities can lead to defective antigen recognition, impaired immune memory, and insufficient opsonization of pathogens. The chronicity of the disease also imposes effects on the non-specific immune system. Factors such as complement protein activity and phagocytic function of neutrophils and macrophages are often impaired. Reduced complement



activity lowers the ability of serum to lyse invading microorganisms, whereas diminished phagocytic function leads to inadequate clearance of bacteria from the tonsillar surface. These patients may thus experience a higher bacterial load, contributing further to the persistence and exacerbation of chronic inflammation [2].

One especially significant immunological finding in chronic tonsillitis is the phenomenon of immune tolerance and autoimmunity. Over time, the continued presence of microbial antigens and degraded tonsillar tissue may elicit an autoreactive immune response. This is reflected in the formation of circulating immune complexes, autoantibodies, and a general breakdown in immune self-regulation. As a consequence, some individuals with chronic tonsillitis may experience not only localized symptoms but also systemic complications, such as rheumatologic disorders, glomerulonephritis, or myocarditis, due to immune-mediated tissue injury. An imbalance in the ratio of Th1 to Th2 cytokine profiles is also typical in chronic tonsillitis. This alteration affects the dominance of cell-mediated versus humoral immunity, leading to further clinical manifestations. Enhanced Th2 activity may promote excessive antibody production and allergic reactions, whereas suppressed Th1 function may weaken the eradication of intracellular pathogens [3].

The above-mentioned changes in immunological indicators in chronic tonsillitis can serve as useful biomarkers for assessing disease activity, predicting complications, and guiding therapeutic approaches. In clinical practice, the restoration of immune function is a significant goal of chronic tonsillitis management. Conservative treatments frequently include immunomodulatory agents, such as bacterial lysates or plant-derived immunostimulants, aimed at normalizing immunoglobulin levels and enhancing cellular and non-specific immunity. Surgical intervention, namely tonsillectomy, is often considered in cases where immune dysfunction is profound and recurrent infections are unresponsive to conservative therapy. Post-operative analyses have shown that tonsil removal can lead to the gradual normalization of many immunological indices, notably the



reestablishment of appropriate T-cell ratios and the enhancement of mucosal and systemic immunoglobulin levels [4].

Monitoring immunological indicators before and after treatment provides valuable insight into treatment efficacy and helps identify patients at risk for persistent immune problems or post-surgical complications. Furthermore, the interrelationship between chronic tonsillitis and other immunopathological conditions, such as atopic dermatitis or bronchial asthma, underscores the broader implications of immune system dysregulation induced by chronic tonsillar disease. With the advent of advanced immunological assays and molecular techniques, recent research increasingly focuses on the role of dendritic cells, regulatory T-cells, and the microbiome in the pathogenesis of chronic tonsillitis. A disrupted tonsillar microbiota may contribute to chronic inflammation by altering antigen presentation and inflammatory mediator production. This emerging field highlights the intricacy of immune responses and the necessity for individualized diagnostic and therapeutic strategies [5].

Inflammatory markers such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are frequently elevated in chronic tonsillitis, reflecting ongoing low-grade systemic inflammation. Although these are not specific markers, combined with detailed immunological profiles, they assist clinicians in diagnosing and monitoring the disease process. There is growing emphasis on identifying genetic and epigenetic factors that predispose individuals to chronic tonsillitis and related immune dysfunctions. Polymorphisms in genes encoding cytokines, immunoglobulins, and innate immune receptors may modulate susceptibility to chronic infection and the resultant immunological changes. By elucidating these mechanisms, future therapies may be better tailored to target the underlying deficits in immune regulation. Children with chronic tonsillitis present unique clinical and immunological challenges, as their developing immune systems may be more vulnerable to persistent dysregulation. Pediatric patients commonly exhibit more pronounced changes in serum and secretory immunoglobulins and greater



susceptibility to recurrent respiratory tract infections. Careful immunological monitoring is therefore essential in managing pediatric chronic tonsillitis and preventing long-term sequelae [6].

Nutritional status and environmental factors can further influence the immune profile of patients with chronic tonsillitis. Deficiencies in micronutrients such as vitamin D, zinc, and selenium may exacerbate immune dysfunction, while exposure to pollutants or allergens may modulate inflammatory responses. Comprehensive management, therefore, involves not only standard medical or surgical interventions but also supportive therapies aimed at optimizing overall immune health. In summary, chronic tonsillitis exerts a significant impact on the human immune system, manifesting as measurable changes in humoral, cellular, and non-specific immunological indicators. These alterations underpin both the local and systemic manifestations of the disease and contribute to its chronicity and complications. Effective clinical management requires an appreciation of these immunological dynamics, vigilant diagnostic monitoring, and an individualized therapeutic approach. Continued research into the immunopathogenesis of chronic tonsillitis and the development of novel immunomodulatory therapies holds promise for improving outcomes and quality of life for affected patients [7].

### **Conclusion:**

Chronic tonsillitis is a multifaceted condition that not only affects the oropharyngeal region but also induces profound changes within the immune system. These alterations encompass reductions in protective immunoglobulin levels, distortions of T-lymphocyte populations, dysregulated cytokine profiles, impaired phagocytic activity, and increased propensity for autoimmunity and immune-mediated complications. The nature and severity of immunological changes are influenced by host factors, duration of disease, microbial factors, and previous interventions. A comprehensive understanding of the immunological disturbances in chronic tonsillitis is crucial for effective diagnosis, prognosis, and therapy. Appropriate management, including immunomodulatory drugs and timely surgical



intervention, can restore immune balance and prevent systemic complications. Ongoing research into the immunobiology of chronic tonsillitis, including genetic, epigenetic, and microbiome-related mechanisms, continues to refine our understanding and pave the way for more precise and effective treatments.

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