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ASSESSMENT OF BIOCHEMICAL AND IMMUNOLOGICAL FEATURES IN BURN DISEASE BASED ON SEVERITY STAGES

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Abstract:

Currently, thermal injuries rank third among all types of trauma worldwide. According to the World Health Organization (WHO), burns are the third most common type of injury. In general, burn injuries affecting more than 10-15% of the body surface are associated with burn disease (BD) and the development of systemic inflammatory response syndrome (SIRS), which often leads to multiple organ dysfunction syndrome (MODS). The role of immunodeficiency in BD has become a major focus of modern research, as both innate and adaptive immune responses exhibit early and prolonged suppression. To assess the severity of burn disease, it is essential to evaluate biochemical and immunological parameters. These indicators are crucial in determining the severity of the injury and the adequacy of the treatment strategy.

Keywords: Burn disease, biochemical indicators, immune system, IL-6, IL-8, CRP, IgM, IgG, inflammation, immunodeficiency.

Research Objective: To determine the characteristics of biochemical and immunological parameters at various stages of burn disease.

Materials and Methods: The study included 45 patients hospitalized with burn injuries. Among them, 15 had mild burns (1st degree), 15 had moderate burns (2nd



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degree), and the remaining 15 had severe burns (3rd degree). Patients were aged between 18 and 60 years; 60% were male, and 40% were female. The causes of burns included hot liquids (47%), open flames (38%), and electric current (15%). Examinations were conducted at the Department of Clinical Laboratory Diagnostics and DKTF Clinical Laboratory Diagnostics Course of Samarkand State Medical University and the Burn Department of the Republican Scientific Center for Emergency Medical Care, Samarkand Branch. Biochemical blood indicators were measured using the photometric method. The levels of cytokines and immunoglobulins in samples were determined using the immunochemical luminescence assay (IXLA) with specific antibodies bound to latex particles.

Results: The study revealed significant differences in the biochemical and immunological parameters of patients depending on the severity of their burns. Mild (1st degree) burns were associated with minor biochemical signs of inflammation, whereas moderate and severe burns (2nd and 3rd degree) showed elevated levels of C-reactive protein (CRP), AST, and ALT. In 3rd-degree burns, levels of inflammatory cytokines, particularly interleukin-6 (IL-6) and interleukin-8 (IL-8), were markedly increased, indicating intense inflammatory processes. Additionally, reduced levels of immunoglobulins IgM and IgG in severe burns pointed to immune system deficiency. Statistical analysis confirmed that increasing burn severity is associated with a sharp rise in inflammatory and immune response indicators ($p < 0.05$). Burn causes and patient gender had no significant effect on the main indicators.

Conclusion: The results of the study show that increasing severity of burn disease leads to significant alterations in the body's biochemical and immune parameters. In particular, high levels of IL-6 and IL-8, along with decreased IgM and IgG levels in third-degree burns, confirm the development of a serious immunodeficient state. Additionally, elevated CRP, AST, and ALT levels reflect the intensity of the inflammatory process. These indicators are essential for assessing the severity of burn disease and developing appropriate treatment strategies. The study confirms



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a reliable correlation between burn severity and changes in biochemical and immunological responses.

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