IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 5, December 2025
Impact Factor: 7.67

# Activity of Immunomodulators in Pharmacy: Mechanisms, Applications, and Advances

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**Abstract:** *Immunomodulators are substances or drugs that modify the immune response by enhancing or suppressing it. They are pivotal in the treatment of various diseases, including autoimmune disorders, cancers, and inflammatory conditions. This review presents an overview of the current knowledge on immunomodulators, focusing on their mechanisms of action, types, therapeutic applications, and recent advances in pharmaceutical research.*

*Immunomodulators are a diverse class of agents that play a crucial role in regulating the immune system's activity by either stimulating or suppressing its responses. These agents are pivotal in the treatment of a wide range of medical conditions, including autoimmune diseases, cancers, infections, and inflammatory disorders. The immune system is inherently complex, involving various tissues, cells, and proteins working in concert to defend the body against pathogens situations where the immune system is either overactive or underactive, immunomodulators restore equilibrium by modifying immune responses. Immunomodulators have a variety of modes of action. Vaccines and cytokines are examples of immunostimulants that boost immune responses to tumor cells or infectious agents, helping to eradicate disease. On the other hand, immunosuppressants, such as corticosteroids, calcineurin inhibitors, and monoclonal antibodies, suppress immune activity in order to control autoimmune activity or prevent tissue rejection after transplantation. Based on their origin and mode of action, these agents are divided into several groups, including synthetic medications like corticosteroids, biologics that target particular cytokines like TNF-α and IL-6, and substances derived from plants like terpenoids and flavonoids.*

*Immunomodulators have a wide range of clinical uses. They are employed in the treatment of infectious diseases, cancer immunotherapy, and autoimmune diseases like rheumatoid arthritis, multiple sclerosis, and inflammatory bowel disease. Significant progress has been made in the development of immunomodulators, including the incorporation of plant-based and herbal therapies, which have promising therapeutic potential because of their bioactive phytochemicals. Despite their therapeutic advantages, issues like side effects, clinical validation, and standardization still exist. Research is still being conducted to better understand their mechanisms, maximize their application, and investigate new agents to enhance patient outcomes in a variety of medical specialties.*

**Keywords**: Immunomodulators, immune system, immunostimulants, immunosuppressants, herbal immunomodulators, autoimmune diseases