

REVIEW ARTICLE

Herbal Immunomodulators - A Remedial Panacea for Designing and Developing Effective Drugs and Medicines: Current Scenario and Future Prospects

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Abstract: Constant exposure to various stressors, such as immune pressure, rapidly increasing population, deleterious changes in the ecosystem, climate change, infection with emerging and re-emerging pathogens, and fast-paced lifestyle, is a critical factor in the globally increasing incidences of immunocompromising health conditions, as well as stress. Synthetic chemotherapeutic agents, which are widely available in the commercial market, may be highly efficacious, but most are immunosuppressive and exert many side effects. Undoubtedly, the pivotal characteristics of immunostimulants and immunomodulators in the maintenance of the health and productivity of humans, as well as animals, cannot be overlooked. Numerous herbs used in ethnoveterinary medicine can be successfully employed as adjuvant rehabilitators to negate the deleterious effects of chemotherapeutics. The sources of these medicinal remedies are part of long traditions in different regions of the world, such as Indian Ayurveda and Traditional Chinese Medicine, which have been developed through empirical experience. Traditional medicine employs a holistic approach to the prevention of disease and traditional herbal medicines are a source of many components with high therapeutic value that are used in modern allopathic medicine. Globally, many studies have been conducted on these herbs and have revealed unique active constituents that activate the innate immune system through the stimulation of macrophages and lymphocytes, and modulation of the cytokine profile, which leads to a state of alertness with a subsequent reduction in the incidence of infection. Immunomodulatory constituents with herbal origins are termed as phytochemicals, including flavonoids, glycosides, polysaccharides, terpenoids, essential oils, various bitters, and alkaloids; all these compounds exert vital, multidimensional effects. Efforts have focused on screening plant preparations to identify immune adjuvant properties; furthermore, several potent phytol adjuvants have been experimentally proven to downregulate inflammatory reactions in addition to enhance specific adaptive responses to vaccines. In this review, we discuss the current status and future prospects regarding the immunomodulatory potential of various herbs and plants and their promising utility for designing and developing effective drugs and medicines in safeguarding the health of humans, animals, and poultry.

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1. INTRODUCTION

The relationship between animals and plants in nature is considered inseparable. Since the dawn of life on earth, they have

coexisted and flourished in a symbiotic manner. Since the advent of human civilization, this relationship has been analyzed thoroughly and improved to a great extent. Ancient societies were closely associated with plants and animals, which were found in and around their living premises, as well as used for their daily necessities such as food, shelter, clothing, and medicines. Three hundred years ago, herbal therapy was recognized as holistic healing practice to counter physical ailments in Asia [1, 2]. The advent of modern biotechnology persuaded Western medical practitioners promptly to

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