

Chapter 56

Nutraceuticals for Human Health and Hypersensitivity Reaction

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ABSTRACT

An allergy is an overreaction of the immune system to a substance called an antigen, e.g., pollen from grasses, dust mites, etc. The drugs used for allergy in allopathy have undesirable side effects. The use of medicinal plants becomes popular due to the adverse effects of allopathic drugs. Nutraceuticals are food playing a significant role in maintaining normal physiological function. Mast cells are immunologically important cells found in almost all parts of our body, and contain histamines, leukotrienes within their granular sacs, along with those of basophils, are responsible for the symptoms of allergy. According to sources mast cell stabilizers can be classified into three categories, e.g., synthetic, semi synthetic and natural. Mast cell stabilising agents from natural resources can be obtained from different group of compounds, e.g., flavonoids, coumarins, phenols, terpenoids, alkaloids. In this book chapter, the active constituents present in them and their mode of action are highlighted using techniques of computational biology, e.g., molecular docking, etc.

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INTRODUCTION

Nutraceuticals are food or part of food playing a significant role in modifying and maintaining normal physiological function that maintains healthy human beings. The term nutraceuticals is first coined from “nutrition” and “pharmaceutical” by Stephen Defelice MD, founder and chairman of the foundation for innovation in medicine (FIM) Cranford, New Jersey, in 1989 (Brower, 1998). According to De Felice, nutraceutical can be defined as, “*a food (or a part of food) that provides medical or health benefits, including the prevention and or treatment of a disease*” (Trottier, Bostrom, Lawrentschuk, & Fleshner, 2010). The nutraceutical industries are interested with three major things e.g. herbal/natural products, dietary supplements and functional foods. Herbal nutraceutical is preferred as a powerful device for human health because it acts against nutritionally induced acute and chronic diseases without any side effect (Chauhan, Kumar, Kalam, & Ansari, 2013). Several researchers highlight different foods and food products for good health and prevention for diseases e.g. in 2013 Liu summarizes well known vegetable potato as rich source of vitamin C, vitamin B-6, potassium, manganese, flavonoids (quercetin and kaempferol), phenolic acids (chlorogenic acid and caffeic acid), carotenoids (lutein and zeaxanthin) and dietary fibers. Fruits and vegetables are sources of vitamins and minerals, phytochemicals which are important antioxidants, phytoestrogens, and anti-inflammatory agents (Slavin, & Lloyd, 2012). Hyson, (2011) reviews the relationship between apple and its components with human health.

Nutraceuticals are related with several therapeutics areas such as anti-arthritis, cold and cough, sleeping disorders, digestion and prevention of certain cancers, osteoporosis, blood pressure, cholesterol control, pain killers, depression, diabetes (Pandey, Verma, & Saraf, 2010; Cooper et al., 2012; Bradbury, Appleby, & Key, 2014) but the present chapter compiled in reference to mast cell stabilizers. Allergens are foreign proteins that when come in contact of part(s) of human body stimulate the production of immunoglobulin types of proteins (antibodies). These allergens react with antibodies (immunoglobulin type E or IgE) produces allergic reactions, also known as immediate-type hypersensitivity reactions. As much as 20% of the general population may be affected by grass pollen as a major cause of allergic disease. At present drugs such as antihistamines, leukotriene receptor antagonists, and corticosteroids are used for symptomatic treatment, but they do not prevent the allergic response. Currently available medicines have certain limitations regarding efficacy and safety.

Search for alternative types of medicines as anti-allergic drugs are going on e.g. in our previous work a specific sense siRNA is identified as anti-allergic drug to treat allergic asthma during immediate type of hypersensitivity reaction, caused by *Zea m 1* pollen allergen (Basu, Basak, & Sarkar, 2016). Presently, in allergen-specific immunotherapy (SIT), the disease-causing allergens is administered for disease-modifying treatment for allergy (Holgate, & Polosa, 2008). Recently, Valenta, Campana, Focke-Tejkl, & Niederberger, (2016) highlights preventive allergy vaccination based on recombinant DNA technology and synthetic peptide chemistry for allergen-specific immunotherapy (AIT) for both therapeutic and prophylactic treatment of allergic reaction. But these methods are not only very specific for specific allergens but also very much expensive. Nutraceuticals as mast cell stabilizers for the treatment of allergy are inexpensive at the same time devoid of any side effect. Many researchers described herbal medicines as a complementary alternative medicine (CAM) to achieve better control of symptoms during allergic disorder. From last decade several group of scientists (Tewtrakul, Itharat, Thammaratwasik, & Oraikul, 2008; Provenza, & Villalba, 2010) investigated the anti-allergic potential of edible plants e.g. mango, banana, okra etc. Three different types of nutraceuticals e.g. black rice (Alberte, Roschek Jr, & Li, 2010), apple (Holvoet, Mercenier, & Zuercher, 2012) and hardy kiwi have been patented for their

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