



Natural Allergens and Herbal Remedies Possessing Antiallergic activity

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Abstract: Allergies are a common health concern affecting millions of individuals worldwide. The increasing prevalence of allergies has led to a growing interest in exploring natural allergens and herbal remedies with potential antiallergic activity. Natural allergens, such as pollen, dust mites, and animal dander, trigger allergic reactions by stimulating the immune system to release histamine and other inflammatory mediators. However, certain natural compounds derived from plants possess antiallergic properties. Many of these compounds exert their effects by modulating immune responses and inhibiting the release of histamine and other inflammatory molecules. Herbal remedies have been used for centuries in traditional medicine systems to treat various ailments, including allergies. Several herbal extracts and formulations have shown promising antiallergic activity. For example, extracts from plants like turmeric (*Curcuma longa*), stinging nettle (*Urtica dioica*), and butterbur (*Petasites hybridus*) have demonstrated anti-inflammatory and antihistaminic properties, effectively reducing allergy symptoms. This review provides a comprehensive overview of natural allergens and herbal remedies known for their ability to alleviate allergy symptoms.

Key words: Allergens • Anaphylaxis • Natural allergens • Immunotherapy • Asthma • Allergic Rhinitis • Dermatitis.

Introduction

Allergy refers to an exaggerated immune response to substances known as allergens that are otherwise innocuous to most individuals. The immune system of allergic individuals recognizes certain substances, or allergens, as foreign invaders and mounts a defensive response, resulting in the release of various inflammatory mediators. This immune response leads to the characteristic symptoms of allergies, such as itching, sneezing, coughing, nasal congestion, skin rashes, gastrointestinal disturbances, and in severe cases, anaphylaxis. (Sheehan *et al.*, 2018). Some of the signs and symptoms of anaphylaxis are difficulty in breathing, swallowing, swelling of lips, tongue, and severe other symptoms. Anaphylaxis usually occurs minutes after exposure to the triggering

substances such as pollen, peanuts, and animal dander, etc. (Liu and Martinez 2016). Understanding the nature of allergies and the diverse array of allergens is crucial for effective diagnosis, management, and prevention.

The likelihood of having allergies rather than a specific allergy is typically passed on through inheritance (Papadopoulos *et al.*, 2012).

Natural allergens

Natural allergens are substances which are present in natural sources that may be biological, chemical, or of synthetic origin and can cause an unusual response in a body. The wide range of plant and animal materials can give rise to allergic retort. They can be transmitted through direct contact, smoke, pollen, and dried plant particles and they may



also get transmitted from the coats of animals. Most of the allergens are protein and glycoprotein and somewhat smaller in size having a molecular weight of 10,000–70,000 da. Although the chemical identity of allergens is unknown.

Types of natural allergens

Pollen grains – These are tiny spores that generally emerge as fine dust in seed plants. The tiny bodies of the various pollen grains vary in size and form. According to their biology, they are prolate, spheroidal, triangular, frequently prolate or elongated, or granulate in form. They develop in the male structures of seed-bearing plants and are impregnated there after being carried by the wind, water, and pests to the female structures. Gymnosperms develop them in the microsporophyll of the microstrobili, whereas angiosperms make them in the anthers of the stamens in the flowers. By inciting and swelling the lining of the nose, pollen grains can trigger seasonal allergic rhinitis or hay fever (Shivamanjunatha *et al.*, 2019).

Dust mites – These are small insects that are like spiders. They mostly eat the skin cells that are lost. They prefer a comfortable environment with a 21°C temperature and 70% relative humidity for growth. This allergy frequently causes skin rashes, watery, itchy eyes, nasal congestion, scratchy throat, and other symptoms (Banerjee *et al.*, 2015)

Latex – Natural rubber latex might cause an allergic reaction. 30–40% rubber particles, 55–65% water, and trace amounts of protein, sterol glycosides, resins, ash, and sugars make up the chemical content of latex. It is a material made from the sap of the *Hevea brasiliensis* rubber tree. Latex reactions can be lethal and range from mild to severe. Anyone can develop a latex allergy, but those who are repeatedly exposed to the material and those who undergo surgery frequently are at an increased risk. It is most usual for children

with spina bifida. An allergic reaction to latex can cause skin rashes, hives, and difficulty breathing (Shubharani *et al.*, 2013).

Animal dander – This is a major contributor to allergy and inflammatory conditions. The cat's sebaceous, anal, and salivary glands create a thermostable protein called Fel d 1, which is primarily found in the cat's skin and hair follicles. By licking or grooming, it is deposited into the fur. Sneezing, nasal congestion, sore throat, and other symptoms are some of the airborne diseases they may spread (Chapman and Wood, 2001).

Peanuts – Peanut allergy is a severe food-related allergy. It mainly develops in a child in the age group of 14 to 24 months of age and it mainly occurs at home. One peanut contains about 200 milligrams of protein. This allergy spreads within a few minutes after exposure. The reason behind this allergy is over activation of the immune system that identifies peanut protein as a threat. An antibody IgE is produced which causes the secretion of chemicals. This allergic reaction can be life-threatening. ARA H1, ARA H3, ARA H2 and ARA H6, are the main allergens found in peanuts. The symptoms of this allergy are digestive problems– diarrhea, stomach cramps, itching in the mouth and throat and rashes, etc. (Duggan *et al.*, 2002).

Molds – Mold is a type of fungus that develops on organic matter that is either damp or rotting. Some people are allergic to the spores that molds produce. The most common molds which cause allergies are Alternaria, Aspergillus, Cladosporium, Penicillium. Symptoms may include – itching in the nose, eyes, sneezing, mucus in the throat and congestion, etc. It may also cause asthma and rhinitis (Miller 2014).

Seafood – Seafood mainly refers to distinct groups of edible aquatic animals which include shellfish, fish, crabs, lobster, mollusks and prawns, etc. Seafood allergies have been increasing gradually over the past two



decades. They can range from minor oral allergy syndrome and urticarial symptoms to possibly deadly anaphylactic responses. This allergy is caused by *anisakis* larvae and can cause anisakiasis. Seafood allergy may cause histamine fish poisoning. Fish and shellfish are the most potent allergens that can trigger serious IgE antibody-mediated adverse reactions by sensitizing the individuals. Symptoms of seafood allergy are hives, swelling of lips, face, throat, and another part of the body, belly pain and choking and coughing of the throat, etc. (Ruethers *et al.*, 2018).

Tree nut – Some of the tree nuts are walnut, pine nut, hazelnut, pecan, and almond, etc. Food and drug administration (FDA) added some more tree nuts which are considered to cause tree nut allergy and they are beechnut, coconut, ginkgo nut, pili nut, and shea nut. By intaking something which contains a nut the body will recognize it has proteins that are harmful invaders and respond accordingly. This allergy may get worse, and the symptoms are vomiting, stomachache, anxiety, hoarseness, and trouble breathing, etc. (Alasalvar and Shahidi (2008).

Weed – There are some cases where weed has shown hypersensitivity and even anaphylactic responses with the symptoms of nasal congestion, pharyngitis, dyspnea, lacrimation, wheezing, etc., and the higher doses may cause bronchitis and asthma. The most common is *cannabis sativa*. The symptoms of sensitivity reactions to marijuana may range from minor ones like conjunctival injection and widespread pruritis to severe ones like urticaria and anaphylaxis. Reliable patient reporting, the creation of testing techniques, and care are all impeded by the illegal nature of cannabis usage and the resulting social stigma. Skin prick test is a test that is regularly used to diagnose these hypersensitivity issues (Nayak *et al* 2013).

***Actinidia deliciosa* (Kiwi fruit)** – It is considered a food allergen, which can cause severe reactions, mainly in young children. Double-blind placebo-controlled food challenge (DBPCFC) confirmed that 53% of individuals are subjected to this type of allergy. Research has shown that the main allergen present in kiwi is actinidin, thaumatin-like protein. It can be taken during pregnancy but in a specific amount. The symptoms are trouble swallowing (dysphagia), vomiting, prickly, itchy, and skin rashes, etc. (Ana Moreno *et al.*, 2015).

***Lupinus metabolis* (Lupin)** – Lupin also known as Lupinus, lupine, regionally bluebonnet, etc. is a flowering plant in the legume belonging to the family Fabaceae. It is mainly consumed in the Mediterranean, especially in the form of flour. Lupin allergy is significant to cause food-induced allergy and anaphylaxis. There are many cases in which people are found with the symptoms of lupin allergy. 42 years old mildly atopic Caucasian woman was suffering from severe urticaria and asthma from the consumption of lupin flour. It is unpredictable and mostly found in adults. It can trigger allergic reactions due to cross-reactivity between lupin and peanut. Lupin is also present in baked goods, bread, and beverages, etc. The symptoms of this are swelling of the throat, pain, nausea, and vomiting. (Carvajal-Larenas *et al.*, 2016).

Eggs – Eggs are one of the most common food allergens and it is mediated by IgE antibodies. Egg allergy is developed when the immune system becomes active against proteins present in egg white and yolks. In egg yolk, alpha-livetin (gal d 5) is the major allergen that is involved in the bird egg syndrome. According to a few research, if the mother eats the egg, there is a possibility that the baby who is breastfed would encounter an allergic reaction to the proteins in the milk. The common symptoms are swelling, eczema, sneezing,



vomiting, diarrhea, and anaphylaxis, etc. (Moneret-Vautrin *et al.*, 1999).

Allium sativum (Garlic)- Unfortunately, it is discovered that in some people it is producing an allergic reaction because of the allicin and diallyl disulfide allergens found in garlic. Garlic dust can induce severe asthma and applying garlic poultices topically can result in burns that are likely allergens. The common symptoms are anaphylaxis, diarrhea, itching, fast heartbeat, and shortness of breath, etc. (Dona and Suphioglu 2020).

Asparagus officinalis (Asparagus)- The allergens present in asparagus are asparagine, coniferin, vanillin and glucoside. They are most likely to cause contact dermatitis from asparagus, it usually causes fingertip dermatitis which can affect the whole hand. Other forms of allergy caused by asparagus are urticaria, conjunctivitis, rhinitis, and asthma. Lipid transfer proteins are present in Asparagus, and they are the relevant allergens. In addition, profilin and glycoproteins harboring complex asparagine-linked glycans can also be involved in this type of allergy. The most common symptoms are runny nose, hives, puffiness, eye irritation, an upset stomach, etc. (Hugh AS and Deborah 1997).

Anthemis nobilis (Chamomile) – Its flower is used to make chamomile oil and the cream which is used in the prevention and treatment of nappy rashes. The allergens present in it are nobilin and desacetylmaticarin and both are sesquiterpenes. The most common symptoms are diarrhea, cramps, bloating and bronchial asthma, etc. (Gaihre *et al.*, 2022).

Ginkgo biloba – It is also known as the maidenhair tree (living fossil) and the allergens present in it is ginkgolide acid. Allergic contact with this can cause dermatitis and cross-reaction with Anacardaceae species including poison, mango, and rhus tree, etc. Allergy to ginkgo biloba mainly occurs from the fresh part of the ginkgo fruit. Pregnant women and people suffering from blood

disorders should not take ginkgo. The common symptoms of this allergy are dizziness, headache, and rashes (Rodriguez *et al.*, 1976).

Acacia melanoxylon (Black wood) – Acacia or wattle is the generic term for black wood. It serves as a binder in the manufacture of various pharmaceuticals as well as in the printing industry. 2,6-dimethoxy-1,4-benzoquinone, acamelin, and melacacidin are the allergens present in it. Additionally, it reacts cross-reactively with meranti and some forms of mahogany. Hay fever, rhinitis, conjunctivitis, and other respiratory problems are of increasing concern. The common symptoms are nausea, giddiness, irritation, skin rashes, and vomiting (Zhao *et al.*, 2014).

Aarnica montana (Arnica) – Wolf's bane and mountain tobacco are the common names for arnica), which is a species of the Asteraceae family. It is a big component of the tincture of arnica, which is used to treat bruises, sprains, and chilblains. Sesquiterpene lactones, helenalin, carbon, and 10-acetoxy-8,9-epoxy-thymol isobutyrate are among the allergens found in arnica. Approximately 100 incidences of arnica allergies have been documented over several centuries. Gastroenteritis can develop if arnica Montana flower tea is consumed. A patient had an allergy to the tincture of arnica. When a potential drug allergy exists, arnica tincture should be a frequent part of the patch test series. Additionally, it reacts with chrysanthemum. The common symptoms are fever rashes and headaches (Sharma *et al.*, 2005).

Peruvian lily- Tuliposide A, a biosynthetic precursor of the carcinogenic lactone tulipalin A, and alpha-methylene-gamma-butyrolactone are the allergens found in this plant. Direct contact with Peruvian lily can cause in fingertip allergy, which is more common in housewives, gardeners, and florists. This may provide a review of sesquiterpene lactone sensitivity. It may also have provoked airborne contact dermatitis. Alstroemeria has also been



reported to produce depigmentation, which is stranger still. There is a cross-reaction of Peruvian lily with Bomarea, Dioscorea, Hispid, Gaga, and Erythronium. The common symptoms of this allergy are rashes, vomiting, swelling, brittle nails, and asthma-like reactions (Ernst and Pittler 1998).

Aesulus hippocastanum (Horse chestnut) – Aesculin is a medicinal ingredient derived from horse chestnut that is used as an astringent and anti-inflammatory. However, there are very little chance, and risk of allergy is there but still, a case was reported where 46 years old male got unusual symptoms like epigastric pain, nausea, and sweating after intaking a horse chestnut. It may also cause cardiac, pancreatic, and hepatic toxicity leading to atrial fibrillation, in addition to gastrointestinal symptoms. Ingestion of this fruit can cause serious side effects and the frequency of adverse effects of the product containing aescin is 0.5% - 3%. For a patient who is suffering from horse chestnut allergy when visiting ed (emergency department), blood examination and electrocardiogram monitoring are required (Obadamudalige *et al.*, 2019).

Recent Advancements in herbal medications for the treatment of allergy

Allergies are a common condition that affects millions of people worldwide. In recent years, there have been several advancements in the treatment of allergies, aiming to alleviate symptoms and improve the quality of life for affected individuals. Here are some recent advancements in allergy treatment:

Sublingual Immunotherapy (SLIT): SLIT is a method of immunotherapy that involves placing allergen extracts under the tongue. Over time, the immune system becomes desensitized to the allergens, leading to a reduction in allergy symptoms. SLIT has shown efficacy in treating allergic rhinitis, allergic asthma, and allergic conjunctivitis. It

is considered a safe and effective treatment option, particularly for allergies caused by pollen, dust mites, and certain animal allergens (Radulovic S *et al.*, 2010).

Biologics: Biologic medications target specific molecules or cells involved in the allergic response. They are typically administered through injections or infusions and are effective in managing severe allergies, such as allergic asthma and chronic urticaria (hives). Biologics like omalizumab, mepolizumab, and dupilumab have shown significant benefits in reducing symptoms and improving quality of life for individuals with severe allergic conditions. (Beck *et al.*, 2014)

Epicutaneous Immunotherapy (EPIT): EPIT is a novel approach that involves applying allergen extracts to the skin using a patch. Allergens are absorbed through the skin, leading to desensitization, and reduced allergic reactions. EPIT has shown promise in treating peanut allergies in children, with some clinical trials demonstrating successful desensitization and increased tolerance to peanuts. (Vickery *et al.*, 2018).

Oral Immunotherapy (OIT): OIT involves gradually exposing individuals with food allergies to increasing amounts of the allergen, aiming to build tolerance over time. Recent advancements in OIT have focused on the treatment of peanut allergies, with studies demonstrating successful desensitization and increased tolerance to peanuts in many participants. However, OIT should only be performed under medical supervision due to the risk of severe allergic reactions. (Anagnostou *et al.*, 2011)

Allergen-specific Immunoglobulin E (IgE)

Inhibitors: Recent research has explored the development of novel treatments that inhibit the binding of IgE antibodies to allergens, thereby preventing the allergic cascade. These IgE inhibitors, such as ligelizumab and quilizumab, have shown promising results in reducing symptoms and improving quality of



life for individuals with allergic asthma and chronic spontaneous urticaria. (Riedl *et al.*, 2020).

These advancements in allergy treatment offer new possibilities for managing allergies and improving the lives of affected individuals. It is important to consult with healthcare professionals for proper diagnosis, evaluation, and guidance regarding the most suitable treatment options based on individual needs and circumstances.

Natural compounds with antiallergic activity

There are several chemical constituents found in plants that have been reported to exhibit antiallergic activity. Here are some examples along with their plant sources and references:

Quercetin: Quercetin is a flavonoid widely distributed in various fruits, vegetables, and herbs. It possesses anti-inflammatory and antiallergic properties by inhibiting histamine release and suppressing allergic mediators. Sources of quercetin include onions, apples, berries, and green tea. (Middleton *et al.*, 2010)

Epigallocatechin gallate (EGCG): EGCG is a catechin found in green tea. It exhibits potent anti-inflammatory and antiallergic activities by inhibiting mast cell degranulation and reducing the release of allergic mediators. (Nantz *et al.*, 2009)

Curcumin: Curcumin is the active component of turmeric (*Curcuma longa*) and possesses strong anti-inflammatory and antiallergic properties. It inhibits the release of histamine, prostaglandins, and leukotrienes, thereby alleviating allergic symptoms. (Jagetia *et al.*, 2007)

Gingerol: Gingerol is the primary bioactive compound in ginger (*Zingiber officinale*). It exhibits anti-inflammatory and antiallergic effects by inhibiting the production of inflammatory mediators such as cytokines and prostaglandins. (Mashhadi *et al.*, 2013)

Rosmarinic acid: Rosmarinic acid is a phenolic compound found in herbs such as rosemary (*Rosmarinus officinalis*) and basil (*Ocimum basilicum*). It exhibits antiallergic activity by inhibiting histamine release, leukotriene synthesis, and mast cell degranulation. (Osakabe *et al.*, 2004)

Conclusion

As we know, natural allergens are the most prevailing cause of the development of asthma and respiratory tract disorders. In this article, some of the natural allergens have been discussed and the role they play to enhance the immune system and antibodies. These allergens have some proteins which can hardly affect the body and have anaphylactic responses. Treatment for this is available, and various types of vaccines and herbal medicines are there which can heal ailments like this. We can also prevent them by changing our lifestyles and by knowing which natural allergens we can respond to. Talking about allergens, we daily get exposed to them in our day-to-day life, some can give severe effects while others can get cured easily. We are still in that situation where many allergies still cannot get cured completely. There is still a long wait to treat these allergies thoroughly and to improve the patient's life with better treatment and fewer side effects.

Conflict of Interest: Nil

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