

## ALLERGENIC COMPOUNDS IN HONEY BEE PRODUCTS

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**ABSTRACT.** Allergy can be defined as a strong specific reaction of the human body to exogenous molecules that may occur in the normal environment. Food allergies are individualistic adverse reactions to foods. Food related reactions are individualistic because they affect only a few people in the population: most people can eat the same foods with no reactions. Adverse food reactions can include IgE and non IgE mediated primary immunological sensitivities, food intolerances, a secondary sensitivities. Bee products such as honeybees, honey, royal jelly and pollen are widely consumed as a health supplement. These products are reported in various reports that may cause allergic reactions when consumed. In this study, the allergic effects and allergen components of bee products consumed as food are described. These allergens include high molecular weight proteins in the bee pollen and honey, MRJ1 and MRJ2 in the royal jelly, and 3-methyl-2-butenyl caffeate, phenylethyl caffeate, benzyl caffeate, geranyl caffeate, benzyl alcohol benzyl cinnamate, methyl cinnamate, ferulic acid, tecto chrysin in the propolis.

### 1. INTRODUCTION

Reactions to foods are not new and have been described for two thousand years. More than 20 % of adults have an allergic reaction to food or food additives like artificial colorings, preservatives, and sweeteners. Food allergy refers to an abnormal immunologic response to allergens in several food, most frequently proteins, that occurs in a susceptible host. These reactions are reproducible each time the food is ingested and they are often not dose dependent. The prevalence of food allergies, as well as the prevalence of all allergic diseases appears to be rising, especially in developed countries [1]. It is well known that anaphylactic reactions to food are one of the most important medical problems. Because they are one of the most common causes of systemic anaphylaxis that is life threatening and one of the most important reasons for seeking emergency medical care [2]. In European countries the most frequently occurring allergies are those to cow's milk protein, eggs, peanuts, nuts, fish, soya and shell fish [3]. The most common food allergies in children after the allergy to cow's milk proteins are the allergies to eggs, peanuts and flour, and in adults the most common food allergies are those to peanuts, nuts, fishes and shell fishes [4].

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TABLE. Symptoms of Ig E-mediated food allergies [5]

<b><i>Gastrointestinal symptoms</i></b>	Eczema or atopic dermatitis
Nausea	<b><i>Respiratory symptoms</i></b>
Vomiting	Rhinitis
Diarrhae	Asthma
Abdominal pain	<b><i>Other symptoms</i></b>
Colic	Laryngeal edema
<b><i>Cutaneous symptoms</i></b>	Anaphylactic shock
Urticaria, Puritis	Hypotension

Beekeeping is the science and art of prolonging, sustaining, and retaining health by using products obtained from honeybee hives, such as honey, bee bread, bee pollen, propolis, royal jelly and bee venom. Recent years have seen the application of honeybee products in both traditional and modern medicine. Today, many studies are directed health benefits and pharmacological properties of bee products due to their efficacies, leading to the increasing development of nutraceuticals and functional food from these products.

Honey is a natural, sweet food collected by honeybees from flower nectars or some insect (mainly Apidea) secretions. While honey has some natural health benefits, it's also possible for some people to develop an allergic reaction to it. Patients with allergy intolerant of honey may have the clinical manifestations such as asthma, cough, anaphylaxis, itching in the mouth and gastrointestinal symptoms [6,7]. Bauer et al [6] showed that, both proteins derived from secretions of pharyngeal and salivary glands of honeybee heads and pollen proteins contained in the honey cause allergic reactions to honey [6]. Hebling et al. [8] studied 22 patients with a history of systemic allergic symptoms following honey ingestion to identify the allergenic components of honey. The group of honeyallergic patients was compared with three control groups. These groups were: 10 subjects sensitized to *Artemis*10 with honeybee venom allergy and 10 without a history of atopy or bee sting reactions. The allergy tests included skin tests and RAST with three different kinds of Swiss honey (dandelion, forest and rape), pollen of Compositae species, extract of bee pharyngeal glands, honeybee venom and bee whole body extract. They showed that 3/4 of honey allergies are sensitive to dandelion honey and 13 of 22 also to Compositae pollen. Nine of the honey allergic patients were sensitized to honey bee venom, three also to bee pharyngeal glands and to bee whole body extract. According to the results they

reported that besides Compositae pollen other allergens, most likely of bee origin are important. In honey allergies primary sensitization may be due either to the honey itself (to airborne Compositae pollen) or even to crossreacting bee venom components. Similarly Fuiano et al. [7] described a case of anaphylaxis to honey in a 19 years old female sensitized to Compositae pollen.

Bee pollen is a highly nutritious substance. It is commonly used to meet the growth and development needs of honeybees, to feed the broods, and to supply the protein required for royal jelly secretion. It is collected from flowers, mixed with salivary enzymes and honey and stored in brood cells. It is known that pollen present in the environment can cause allergic reaction and allergic rhinitis symptoms. Martin- Munoz et al. [9] described an allergic reaction after ingestion of bee pollen in a 4year old boy had developed rhinitis. The composition of bee pollen was *Artemisia vulgaris* ( 4.41%), *Taraxacum officinalis* (% 3.13), *Helianthus* sp. (5.15%), Rosaceae 16%), *Cistus* (13.98%), *Echium* (13.30%), *Quercus ilex* 20.23%), *Quercus robur* (5.09%), *Genista* (3.86%), others (14.83%). Prick test were positive to bee pollen and all local pollen extracts and negative to any other allergen sources. Cohen et al. [10] three patients presented who ingested bee pollen and experienced an immediate allergic reaction. Their examination revealed that the bee pollen contained dandelion pollen, which belongs to the Compositae as do ragweed. In vivo and in vitro studies demonstrated that the patients were sensitive to several Compositae family members, rather than to insect-derived antigens. Similarly Bousquet et al. [11] described a beekeeper had an inhalant allergy to Compositae pollen presented an adverse reaction while eating a honey contained large numbers of Compositae pollens. Moreover, eosinophilic esophagitis (EE) is a chronic inflammatory disease of the esophagus characterized by eosinophilic infiltration in the mucosa and the most common symptoms are vomiting, abdominal pain, weight loss, and dysphagia. GÜNGÖR [12] stated that one possible mechanism in the development of EE from aeroallergens results from deposition of pollen in the pharynx, with subsequent swallowing of nasal secretions and deposition of pollen into the esophagus. The pollen plays a role in EE, but is probably not a main causative factor [13].

Royal jelly (RJ) is also a highly nutritious honeybee product. It is secreted from the hypopharyngeal glands of young (5–15 days old) bees and is effective in the differentiation of female eggs in queen bees. Royal jelly is widely consumed in the community and has perceived benefits ranging from promoting growth in children and improvement of general health status to enhancement of longevity for the

elderly. However, royal jelly consumption has been linked to contact dermatitis, acute asthma, anaphylaxis and death. High prevalence of positive skin tests to royal jelly has been reported among atopic populations in countries with a high rate of royal jelly consumption. The major allergens of royal jelly are MRJ1 and MRJ2 in a study [14]. MRJP1 is the most abundant and best characterized glycoprotein of royal jelly and MRJ2 is the third most abundant royal jelly protein after MRJP1 and MRJP3. Lombardi et al. [15] described two cases of severe systemic reactions (anaphylaxis and generalized urticaria/angioedema) due to honey and royal jelly ingestion in patients sensitized to *compositae* (mugwort). They showed that both the clinical data and the laboratory analysis support the hypothesis of a strict link between sensitization to *compositae* and adverse reactions to honey and jelly.

Propolis, another honeybee product, is a natural resinous hive product. Honeybees collect this resinous material from abundant plant sources around the hive, and mix it with saliva and beeswax. Propolis contains fatty acid derivatives, phenolics, including aromatic aldehydes and alcohols, flavonoids, naphthalene, and stilbene derivatives. There are some case reports of propolis causing contact dermatitis [16]. Various allergens have been isolated from propolis namely 3-methyl-2-butenyl caffeate, phenylethyl caffeate, benzyl caffeate, geranyl caffeate, benzyl alcohol benzyl cinnammate, methyl cinnammate, ferulic acid, tecto chrysin [17].

## 2. DISCUSSION

As a result, bee products are now widely consumed as a functional food. However, when some products are consumed, allergic reactions can cause health problems. Particularly, it is recommended that atopic individuals should use caution when using products and perform preliminary tests.

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