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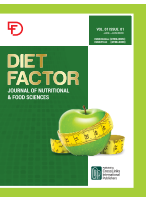

Review Article

Cashew Nut Allergy: A Review

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ABSTRACT

A severe health problem brought on by increased cashew nut use and dietary and cooking changes is cashew nut allergy. It is brought on by the use of trace amounts of Ana-o 3, Ana-o 1, and Ana-o 2 allergens from cashew nuts. Enzymatic processing, oral immunotherapy, and adrenaline auto-injector devices are effective treatment options. The labelling of foods containing cashew nuts is crucial for prevention.

INTRODUCTION

Different foods that include proteins in their primary, secondary, and tertiary forms can result in allergic reactions [1]. Most deadly food-induced responses are caused by tree nuts and peanuts. Tree nut allergies are widespread and frequently cause severe reactions, ranging from minor mouth irritation to anaphylaxis. This form of allergy varies in prevalence according to age and location and seems to have become more common in kids [2]. Due to their high levels of unsaturated fatty acids and low levels of saturated fatty acids, cashew nuts are a significant food allergy. Due to the potential for severe allergic reactions, cashew nut allergies are on the rise worldwide, particularly in Singapore. An underappreciated healthcare issue is this allergy, particularly in kids [3, 4].

Cashew Nuts

Anacardium occidentale L., a native of Brazil and a common tree around the world, is an evergreen South American nation [5]. Its average annual production over the past ten years has been 547,371 metric tons, making it the third most popular tree nut in the United States. It has been discovered that the cashew nuts are a rich source of hydrolysable tannins, with polymeric proanthocyanidins serving as the main polyphenol [6]. When compared to raw cashews, high temperature (HT)-treated cashew skin showed 3-fold greater gallic acid levels, indicating that gallic acid is released during heat processing. The TPC and

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antioxidant activity of the HT-treated cashew skin was higher than that of the low-temperature-treated samples. To determine the flavonoid concentration of cashew co-products, more research should be done. Cashew nuts' nutritional makeup was determined by their bioactive chemical content, which includes oleic and linoleic acids, phytosterols, arginine, tocopherols, magnesium, and phenolic compounds. The largest quantities of phenolics and tocopherols were found in the wrapped nuts, whereas thiamin, carotenoids, and unsaturated fatty acids were noticeable in the raw cashew nut kernels [7]. The cashew tree is one of the most productive tree crops for recovering lost land. It is also used to treat psychiatric issues, increase bone mineral density, and decrease depression rates. Due to their high nutritional and energy content, nuts have played a significant role in numerous cultures and civilizations for centuries [8]. They are well recognized for having a high quantity of unsaturated fatty acids, fiber, vitamins, minerals, and amino acids. Consuming nuts has been linked to lower risks for metabolic syndrome as well as lower risks for cardiovascular disease and mortality. Cashew trees are widely distributed throughout tropical regions near the equator, and their nutritional makeup may vary depending on where they were grown [9]. According to recent study, milk chocolate recipes can include 25% roasted cashew kernels in place of powdered milk. Many processed items, including confections, butters, baked goods, and snacks, contain cashew nuts. They contain 21% protein and 40–57% oil respectively. Because of their fragility, they are utilized in sweets. 3.58 million tons of cashew nuts were produced in 2021, marking a sharp increase in production. Cashews, however, have not been the subject of much study [10].

Allergens present in Cashew Nuts

Because eating cashew nuts can cause a number of allergy disorders, sensitivity to them has the most clinical impact. An individual's cashew allergy is confirmed via a competitive inhibition test. Three well-known allergies for cashew nuts are Ana o 1, A vicilin, an Ana o 2, an 11S globulin that resembles a legumin, and an Ana o 3, a 2S albumin. Western immunoblotting was used to examine patients with cashew nut allergies. It was discovered that 81% of them were allergic to recombinant Ana o 3, 62% to recombinant Ana o 2, and 50% to recombinant Ana o 1. IgE-immunoblot can be used to identify IgE-binding proteins in the protein extracts of these nuts [11]. In addition to location-based mutations brought on by allergies, recombinant DNA technology is employed to affect the different allergens. Using soluble protein extract, defatted cashew nut flour is produced. A sample's protein content can be estimated using the Bradford protein test [12]. Use of PCSH, also known as pyrrole-2-carboxaldehyde salicyl hydrazone, in immunotherapy for cashew allergy. Because there is basic pepsin digestion present, it reduces IgE reactivity while maintaining T cell boosting properties [13]. Avoiding allergens is the best way to cure a seed allergy or any other kind of allergy. Children with food allergies are encouraged not to share their lunch with their peers and to pack their own lunch for school. In the case of allergens, pepsin digestion shows to reduce allergenicity, especially in the context of oral allergy syndrome and for food allergens. Due to their dietary sensitivities, people with increased HRQL may seek medical attention [14].

Clinical Features

Cashew allergies are becoming more common, and their clinical symptoms can range from itchy mouth to catastrophic anaphylactic shock. A simple clinical reaction could be the result of a modest amount of cashew nut allergen [15]. Every five years, the Royal Children's Hospital in Melbourne receives reports of approximately 117 anaphylactic events, with cashew nut allergies being more common than peanut allergies. Skin or mucosal contact alone caused significant allergic reactions in 5 out of 27 patients with cashew nut allergies as shown in table 1 [16].

Table 1: Patients with cashew nut allergies

Allergic reactions	Symptoms	Number of cases
Anaphylaxis	Respiratory/skin/GIT	5 (25)
	Respiratory	3 (15)
	Respiratory and skin	8 (40)
	Respiratory and GIT	3 (15)
	CVS/skin/GIT	0 (0)
	Respiratory/CVS/skin	1(5)
Non-anaphylaxis	Skin/GIT	0 (0)
	GIT	0 (0)
	Skin	7 (100)

Anaphylaxis symptoms and non-anaphylaxis symptoms are separated in terms of medical terminology. Anaphylaxis, a multisystem allergic reaction, is a term used to describe conditions affecting the skin, gastrointestinal tract, respiratory, and cardiovascular systems. Skin conditions and gastrointestinal problems without respiratory or cardiovascular symptoms are examples of non-anaphylaxis symptoms. To avoid anaphylaxis, infants must consume nuts in the recommended doses. Due to its high content of saturated fatty acids, cashews have been exempted from nut and heart health claims [17]. There is, however, a dearth of clinical evidence linking cashews to blood lipids. This suggests that cashews might have similar results to other nuts however there is a paucity of clinical evidence. Consumption of cashew nuts has been connected to higher blood levels of high-density lipoprotein, cholesterol, and triglycerides, which is related to the reduction of diabetes risk factors. Additionally, the anacardic acids found in cashew nuts may one day be used

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to treat a variety of illnesses. Mediterranean diet and add a few handfuls of nuts to their daily diet have a 30% decreased incidence of severe cardiovascular events and mortality [18].

Diagnosis

History and in vitro testing are some of the criteria used to diagnose cashew nut allergy. According to studies on the diagnosis of cashew nut allergies, the majority of kids who had anaphylaxis symptoms had eaten the particular relevant nut. For measuring the challenges' effects, skin prick tests are analyzed to have high rates in relation to sIgE. The symptoms of cashew nut allergy cannot yet be investigated using a purported allergy illustration that can replace a double-blind, placebo-controlled food challenge test [19].

Management

According to studies, preparing cashew nuts enzymatically can lessen allergy reactivity by blocking IgE from binding to nut allergens. The Aspergillus genus is playing a bigger role in the food processing sector, and *A. niger* and *A. oryzae* are two natural pollutants found in cashew nuts. For the treatment of allergies, oral immunotherapy is being developed, along with dietary restrictions against plant-based meals and the substitution of similar foods. For a better understanding of the treatment of cashew nut allergy, more research is required [20]. A popular meal that can induce severe anaphylaxis is tree nuts. Adrenaline is a hormone that is safe and effective against food allergies, and accurate food labelling is required to manage label compliance. Tree nuts have a wide range of applications, such as a garnish for salads, ice cream toppings, baked goods, and Asian cuisine [21]. Tree nuts are among the top eight food allergies, and according to the 2004 Consumer Protection Act (FALCPA) they must be disclosed on product labels. In the Far East and Indian subcontinent, cashews are utilized in cooking, and tree nut oils can be discovered in lotions, soaps, and hair care products. Asian restaurants, baking, confectionary, sweets, ice cream, and chocolates should all be avoided by anyone with severe nut allergies [22].

CONCLUSIONS

Anaphylaxis can result from a significant allergy to cashew nuts. It can be identified via a test on a meal challenge that is double-blind and placebo-controlled and is brought on by 2S albumins and proteins that resemble legumes. It is advised to limit the consumption of pistachio nuts and other associated allergies.

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Writing-review and editing: MKN, FH

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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