

Cannabis and hemp seed allergy

Salma Alkhamash, MD, Harmony Tsui, BSc, MD, and David M.P. Thomson, PhD, MD



Clinical Implications

- Cannabis sensitization may lead to sensitization to hemp seeds. We present 15 patients with allergic reaction and positive skin prick test result to hemp seeds, cannabis, or both.

TO THE EDITOR:

Cannabis is a flowering plant in the family of Cannabaceae, and the most widespread species is *Cannabis sativa*. Hemp seed is a variety of the *C sativa* plant species that is grown for the industrial uses of its derived products.¹ Although cannabis as a drug and hemp are both derived from the same species and contain the psychoactive component tetrahydrocannabinol (THC), they are distinct strains. Hemp has a lower concentration of THC and a higher concentration of cannabidiol, which decreases THC's psychoactive effect.² Hemp seeds from the hemp plant have many nutritious benefits. The augmented interest for highly nutritious foods has increased the widespread availability and use of hemp seeds in the food industry, which will in turn contribute to the frequency of this hemp seed allergy and possibly cannabis cross-reactivity.

In early 2018, before the legalization of cannabis in Canada, 14% of Canadians aged 15 years and older reported some use of cannabis products.³ Its use is still illegal in many countries. Canada legalized the use of cannabis for recreational purposes on October 17, 2018. Since 1998, commercial production of industrial hemp, containing 0.3% THC or less, was legalized in Canada under licenses and authorization from Health Canada. Until 2018, growing of hemp in the United States was not permitted but imported hemp seed was legal in food products and as of 2000 has been sold in health food stores.

Cannabis allergy has been recognized for the past decade, but the prevalence was probably underreported by patients because of its past illegal status. The clinical presentation can vary from mild rhinoconjunctivitis, urticaria, to angioedema or severe systemic reactions. These symptoms are provoked with smoking or handling cannabis.⁴ A few studies have reported possible allergens responsible for cannabis allergy such as delta-9-tetrahydrocannabinol (THC),⁴ nonspecific lipid transfer protein (Can s 3),^{5,6} and others.⁷ Allergy testing is not standardized and usually done with fresh cannabis buds.⁸ However, hemp seed allergy had been described in a few case reports in the literature.⁹ To our knowledge, there are no published data on coexistence of cannabis and hemp seed allergy.

A series of 15 patients presented with allergic reaction to hemp seed, cannabis, or both to our clinics in Montreal (see Table E1 in this article's Online Repository at www.jaci-inpractice.org). Their age ranged from 15 to 38 years (mean age, 28 years). There were 9 men and 6 women. All were tested by skin prick tests

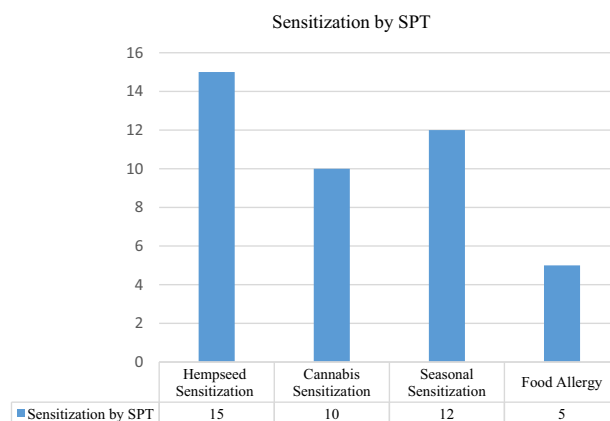


FIGURE 1. Prevalence of hempseed, cannabis, seasonal sensitization, and food allergy sensitivity: 15 patients had positive SPT result to hemp seeds; 10 patients tested to cannabis had positive SPT result; 12 of 15 patients had positive SPT results to trees or weed pollens; and 5 of 15 patients had positive SPT results to pitted fruits or tree nuts.

(SPTs) with fresh hemp seed and pollens (birch, maple, oak, grass, mugwort, plantain, and ragweed) and 10 were tested by SPT with cannabis. SPTs for tree nuts and fruits were performed for patients if indicated. The majority (12 of 15) were atopic (seasonal allergic rhinitis, asthma, eczema, or food allergy). Two of 3 of those who did not have clinical symptoms had positive SPT results to pollens, tree nuts, or fruits (Figure 1).

Eleven patients had symptoms upon their first known ingestion of hemp seeds. Seven presented with anaphylaxis, 2 had angioedema, 1 had an asthma exacerbation, and 1 had minor symptoms. All had positive SPT result to hemp seeds and the 6 tested to cannabis also had positive SPT result. Of the 11 hemp-allergic patients 8 had smoked cannabis. Three hemp-allergic patients had not smoked cannabis, and 1 of the 3 was tested to cannabis and the SPT result was positive. Four patients presented with allergic symptoms to cannabis, and all had positive SPT results to cannabis and hemp seeds, although they never had exposure to hemp seeds.

Mean wheal size for hemp seed SPT was 8 mm, whereas for cannabis it was 12 mm. Two patients were tested with fresh and microwaved (for 1 minute) cannabis and heating did not appreciably change the size of the skin reaction (Table E1).

Typical symptoms of the hemp seed reactions were seen in a 23-year-old man (patient 6 in Table E1) who consumed a cereal snack of hemp seeds. Within an hour, he developed generalized urticaria, dizziness, and angioedema of the lips and eyelids (Figure 2). In the past, he noticed eye itchiness and eyelids swelling after rolling cannabis and touching his face. He had no symptoms from cannabis smoke. SPT result was positive for fresh and microwaved cannabis and fresh and microwaved hemp seeds.

As noticed in our 15 patients, cannabis use is common in young age. Now because of legalization of cannabis in Canada, we expect a rise in its use. In addition, the augmented interest for highly nutritious food supplements will increase the use of hemp



FIGURE 2. Patient with angioedema 1 hour after ingesting hemp seeds. SPT result positive to hemp seeds and cannabis. Also, he had a history of spring and summer pollinosis and had positive SPT results to birch pollen trees, nuts, and fresh pitted fruits (Table E1).

seeds in the food industry, which will in turn increase the frequency of exposure and possibly allergic reactions. The clinical presentation of allergy to cannabis or hemp seed is variable. All the patients who presented with anaphylaxis or angioedema to hemp seed had no known prior exposure and may have been sensitized through cannabis exposure. Alternatively, tree or weed pollinosis may result in cross-reactive sensitivity to homologous proteins in hemp seed and cannabis.⁸ The available data on skin testing are with fresh cannabis and may differ from one preparation to the other. There are no available data on allergen stability. We have used the patients' own cannabis, which was heat resistant as was hemp seed.

The 4 patients who had allergic reactions to cannabis never had known exposure to hemp seed. Nonetheless, they still had positive SPT result to hemp. Although patients may know of their cannabis allergy, they may not be aware of the cause of their allergic reaction after ingesting hemp seeds.

In conclusion, multiple reports have described cannabis allergy⁶⁻⁸ and others have documented hemp seed allergy.⁹ However, to our knowledge, there is no available information on clinical cross-reactivity. This report shows that hemp and cannabis can both induce clinically relevant allergic cross-reactivity and that hemp allergy can manifest as severe anaphylaxis.

Montreal General Hospital Allergy and Immunology Department, McGill University, Montreal, QC, Canada

No funding was received for this work.

Conflicts of interest: The authors declare that they have no relevant conflicts of interest.

Received for publication January 14, 2019; revised February 26, 2019; accepted for publication February 27, 2019.

Available online March 22, 2019.

Corresponding author: Salma Alkhamash, MD, 1650 Cedar Ave, H3G 1A4 Montreal, QC, Canada. E-mail: salma.alkhamash@yahoo.com.

2213-2198

© 2019 Published by Elsevier Inc. on behalf of the American Academy of Allergy, Asthma & Immunology

<https://doi.org/10.1016/j.jaip.2019.02.045>

REFERENCES

1. Stevens PF. Angiosperm Phylogeny Website, version 14. Available from: <http://www.mobot.org/MOBOT/Research/APweb/>. Accessed February 25, 2014.
2. Swanson TE. Controlled substances chaos: the Department of Justice's new policy position on marijuana and what it means for industrial hemp farming in North Dakota. *North Dakota Law Rev* 2015;90:613.
3. Statistics Canada. National Cannabis Survey, first quarter 2018. Available from: <https://www150.statcan.gc.ca/n1/daily-quotidien/180418/dq180418b-eng.htm>. Accessed January 18, 2019.
4. Liskow B, Liss JL, Parker CW. Allergy to marihuana. *Ann Intern Med* 1971;75:571-3.
5. Gamboa P, Sanchez-Monge R, Sanz ML, Palacin A, Salcedo G, Diaz-Perales A. Sensitization to *Cannabis sativa* caused by a novel allergenic lipid transfer protein, Can s 3. *J Allergy Clin Immunol* 2007;120:1459-60.
6. Rihs HP, Armentia A, Sander I, Bruning T, Raulf M, Varga R. IgE-binding properties of a recombinant lipid transfer protein from *Cannabis sativa*. *Ann Allergy Asthma Immunol* 2014;113:233-4.
7. Nayak AP, Green BJ, Sussman G, Berlin N, Lata H, Chandra S, et al. Characterization of *Cannabis sativa* allergens. *Ann Allergy Asthma Immunol* 2013;111:32-37.e4.
8. Decuyper I, Ryckebosch H, Van Gasse AL, Sabato V, Faber M, Bridts CH, et al. Cannabis allergy: what do we know Anno 2015. *Arch Immunol Ther Exp (Warsz)* 2015;63:327-32.
9. Bortolin K, Ben-Shoshan M, Kalicinsky C, Lavine E, Lejtenyi C, Warrington RJ, et al. Case series of 5 patients with anaphylaxis to hemp seed ingestion. *J Allergy Clin Immunol* 2016;137:AB239.

ONLINE REPOSITORY

TABLE E1. Patients' demographic characteristics, reaction type, exposure, atopies, and skin testing results

Patient no.	Age (y) Sex	Reaction to hemp seeds (H) and/or cannabis (C)	Symptoms to H	Exposure to C	SPT wheal diameter (mm)*			Atopy
					H†	C‡	Other§	
1	21 M	Eye itchiness (C)	N¶	Y¶	7	Fresh 12 microwaved 9#	Birch	None
2	28 M	Anaphylaxis (H) Rash (C)	Y	Y	20	30	Birch Ragweed Grass Tree nuts	SAR
3	32 M	Allergic reaction (C) (H)	Y	Y	12	20	Trees Grass Ragweed	SAR Asthma
4	15 F	Asthma exacerbation (H)	Y	N	6	NT 10	Tree nuts	Food allergy
5	21 M	Nasal congestion (C)	N	Y	7	14	Tree nuts	Food allergy
6	23 M	Anaphylaxis (H) Eyelid swelling and eye itchiness (C)	Y	Y	Fresh 8, microwaved 7#	Fresh 7, microwaved 8#	Birch Tree nuts Pitted fruits	SAR
7	33 F	Angioedema (H)	Y	Y	7	NT	Ragweed	None
8	26 F	Rhinitis (C)	N	Y	4	6	Grass Ragweed	SAR
9	37 F	Anaphylaxis (H)	Y	N	3	NT	Ragweed	SAR
10	35 F	Angioedema (H)	Y	N	9	4	Birch	Food allergy
11	29 F	Anaphylaxis (H) Rhinitis (C)	Y	Y	12	NT	Birch Grass Ragweed	SAR
12	38 M	Anaphylaxis (H)	Y	Y	9	NT	Birch Grass Ragweed	SAR Eczema
13	28 M	Anaphylaxis (H) Rhinitis (C)	Y	Y	5	4	Peach Cherries Tree nuts	None
14	28 M	Anaphylaxis (H) Rhinitis (C)	Y	Y	10	10	Birch Ragweed	SAR
15	23 M	Asthma, rhinitis, and eye and nose itchiness (C)	N	Y	5	8	Tree	SAR
							Mugwort Ragweed	

F, Female; M, male; NT, not tested; SAR, seasonal allergic rhinitis.

*SPT: positive result is a wheal of 3 mm or greater than that achieved with negative saline control. Negative control is saline and positive control is histamine with wheal of 3 mm or greater.

†H: Organic traditions hemp seed were used in testing.

‡C: Patients were, in general, tested to samples of their own cannabis.

§All patients were tested for pollens: birch, grass, and ragweed. Those with positive readings are mentioned.

||Atopy: presence of SAR, asthma, eczema, or food allergy.

¶Y: presence of exposure and symptoms. N: absence of exposure.

#Samples were mixed with 0.2 cc saline and microwaved for 60 s.

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.