
Cannabis (hemp) positive skin tests and respiratory symptoms

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Background: We have noted several patients who had rhinitis and/or asthma symptoms when exposed to Cannabis plants in the summer months. Cannabis plants are common in the Midwest.

Objectives: To examine whether Cannabis might be a clinically important allergen, we determined Cannabis pollination patterns in the Omaha area for 5 years, the prevalence of skin test positivity, and the association with respiratory symptoms.

Methods: Airborne Cannabis (and other weed) pollens were collected using a Rotorod air impactor, and pollen counts were done using a standardized protocol.

Results: Measurable Cannabis pollen count was not recorded until the last 2 weeks of July. Peak pollination typically occurred during mid- to late-August, and comprised up to 36% of the total pollen counts. Cannabis pollen was not observed after mid-September. To determine the prevalence of skin test positivity, we added Cannabis to the multi-test routine skin test battery. Seventy-eight of 127 patients tested (61%) were skin test positive. Thirty of the 78 patients were randomly selected to determine if they had allergic rhinitis and/or asthma symptoms during the Cannabis pollination period. By history, 22 (73%) claimed respiratory symptoms in the July through September period. All 22 of these subjects were also skin test positive to weeds pollinating during the same period as Cannabis (ragweed, pigweed, cocklebur, Russian thistle, marsh elder, or kochia).

Conclusions: The strong association between skin test reactivity, respiratory symptoms, and pollination period suggests that Cannabis could be a clinically important aeroallergen for certain patients and should be further studied.

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INTRODUCTION

Cannabis sativa or Cannabis (also known as marijuana) has been a legitimate and legal agricultural crop. Near Omaha, Nebraska, it was cultivated to provide raw material for a string factory in the 1880s.¹ It was cultivated again during World War II to make rope, and today, varieties of Cannabis are still grown for fiber. The drug marijuana is derived from the pistillate flower clusters of Cannabis. Cannabis grows wild along ditches, streams, roadsides, fences, and in fields and open areas where the soil is moist. Wild Cannabis is common in the east-

ern Dakotas, Nebraska, Missouri, Kansas and Iowa.

Cannabis belongs to the mulberry family whose members include mulberries, hops, and the Osage orange. Cannabis pollen grains are triporate and are shed during the summer. The pollen grains do not have any psychotropic components. The pollen is extremely buoyant, and may account for a significant percentage of the total pollen count.¹

The potential allergenicity of Cannabis pollen was first supported by a case report of a physician who developed symptoms of rhinoconjunctivitis when walking near pollinating plants. After skin testing with a hemp pollen extract she developed an anaphylactic reaction.¹

We have also noted that many patients complain of rhinitis and/or asthma symptoms when exposed to

Cannabis plants during the summer. The clinical significance of Cannabis pollen as an aeroallergen is still undefined, and an extensive literature search revealed only four references.^{1–4} We, therefore determined Cannabis pollination patterns in the Omaha area for 5 years (1992–1996), the prevalence of Cannabis skin test positivity, the association of Cannabis pollination and skin test responsiveness with respiratory symptoms, and the relationship of these findings to other clinically important aeroallergens with a similar pollination period.

METHODS

In order to define the Cannabis pollination period, manual pollen counts were performed. The pollen was collected with a Rotorod air impactor placed on a third-story rooftop and run 60 seconds every 10 minutes. Collection and counting were done according to the American Academy of Allergy, Asthma and Immunology Aeroallergen Monitoring Network Protocol (Milwaukee, WI). Counts are determined as pollen grains/m³ over the previous 24-hour period.

Allergic potential was assessed by multi-test skin test (Lincoln Diagnostics, Inc, Decatur, IL) with antigens obtained from Bayer Pharmaceuticals (Spokane, WA). Standard positive (histamine) and negative (saline) controls were used. Skin tests were read and results were recorded at 15 minutes. The definition of a positive skin test required a wheal greater than or equal to 3 mm more than the saline control.

Over an 8-month period in 1996, 127 subjects with symptoms of allergic rhinoconjunctivitis and/or asthma underwent multi-test skin testing including Cannabis.

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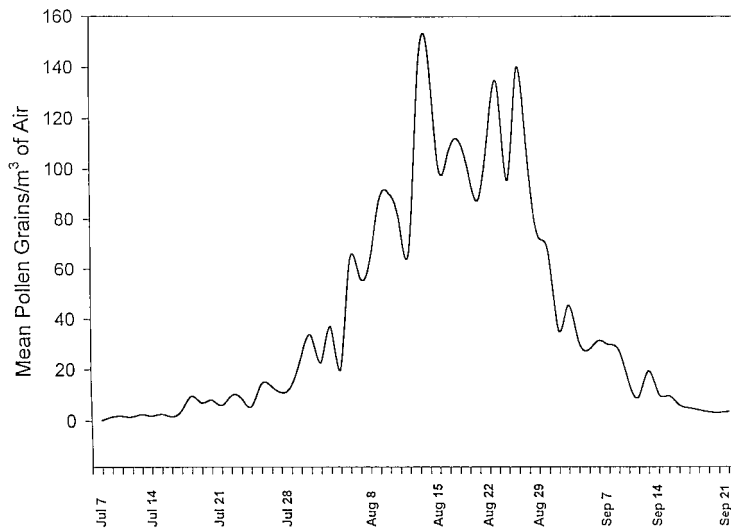


Figure 1. Mean Cannabis pollen counts for the 5-year period, 1992–1996, in the Omaha, Nebraska area.

RESULTS

The Cannabis pollination period in the Omaha area lasts from the end of July to mid-September peaking in mid to late August. The peak pollination period may last for several weeks (Fig 1). During this time period Cannabis pollen may comprise up to 36% of the total pollen count. The pattern of Cannabis pollination is similar to several known clinically significant aeroallergens including ragweed, nettle, and pigweed. Of the weed pollens, only ragweed, nettle and pigweed were more numerous during this time period (Fig 2).

Of the 127 patients evaluated, 78 (61%) were skin test positive to Cannabis. Of these patients positive to Cannabis by skin testing, 30 patients were randomly selected to determine if

they had allergic rhinitis and/or asthma symptoms during the Cannabis pollination period. Of these 30 patients, 73% (22/30) had respiratory symptoms during the Cannabis pollination period.

Of the 30 randomly selected patients all were skin test positive to at least two other known common aeroallergens with similar pollination periods as Cannabis, and 47% (14/30) were positive to all seven allergens tested. The seven aeroallergens that also demonstrated a positive skin test response in these patients included ragweed 93% (28/30), marsh elder 96% (29/30), cocklebur 90% (27/30), kochia 90% (27/30), pigweed 83% (25/30), Russian thistle 73% (23/30), and western water hemp 70% (22/30) (Table 1). Indeed, a review of the skin test results from the 30 patients indicated that

all patients had positive skin test responses to multiple weed pollens. Thus, with the exception of ragweed pollen which has been proven to be an important aeroallergen, it would be difficult to determine the clinical significance of these other less prominent weeds as well.

DISCUSSION

Cannabis skin test-positive patients demonstrated typical symptoms of allergic respiratory disorders during Cannabis pollination periods. These patients were also sensitized to other weeds with similar pollination periods. Indeed, all 78 cannabis skin test-positive subjects were also skin test-positive to other weed pollens. Furthermore, cross-reactivity rates between Cannabis and other weeds have not been defined; thus, the contribution of Cannabis to seasonal respiratory symptoms is unknown. Given the prevalence of skin test positivity to Cannabis among patients with seasonal allergic respiratory symptoms, it is conceivable that the contribution of Cannabis pollen to these seasonal complaints is as significant as that for other pollens thought to be clinically important, and used in immunotherapy. To prove the potential of Cannabis pollen to induce clinically important respiratory symptoms in sensitized individuals, appropriate respiratory challenges need to be carried out.

Increased awareness and study of Cannabis' potential as a clinically significant aeroallergen should be fostered. The recent increase in medicinal, recreational and industrial use of this

Table 1. Skin Test Positive Responses for Multiple Weed Pollens

	Cannabis	Western Water Hemp	Ragweed	Pigweed	Cocklebur	Russian Thistle	Marsh Elder	Kochia
Western water hemp	70	—	95	100	85	76	100	90
Ragweed	93	71	—	85	85	75	100	89
Pigweed	83	84	96	—	88	72	100	92
Cocklebur	90	66	92	81	—	77	96	88
Russian thistle	73	72	95	81	95	—	100	95
Marsh elder	96	72	93	86	89	75	—	89
Kochia	90	70	92	79	92	77	96	—

Percent of subjects with positive skin tests to aeroallergens noted on the horizontal axis having a positive skin test to pollens noted on the vertical axis. Total number of cannabis positive skin test responders was 30.

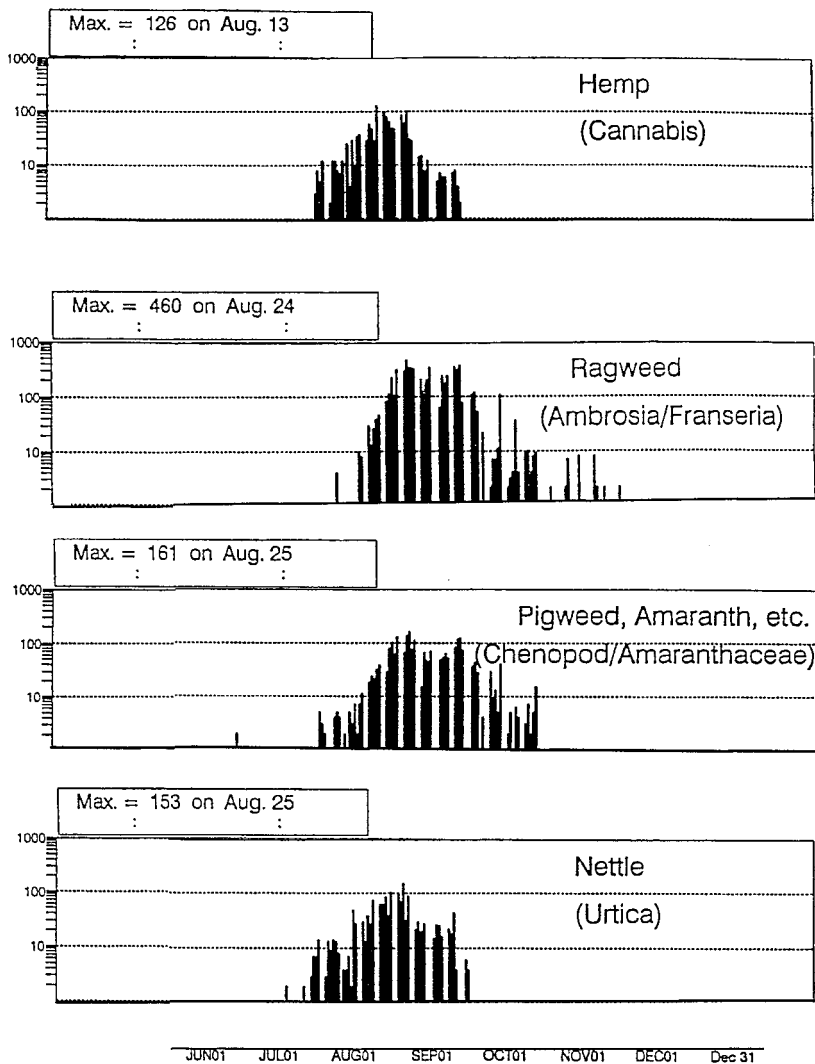


Figure 2. Pollen counts (grains/m³ of air) of Cannabis (hemp) and other weeds sharing a similar pollination period. Data are from 1994, a representative year in the Omaha, Nebraska area. Maximum pollen counts and corresponding dates are noted in the upper left hand corner of each figure. Adapted from the American Academy of Allergy and Immunology 1994 Pollen and Spore Report (Milwaukee, WI) with data supplied by Rita Hartel, RN.

plant may lead to further cultivation and more intense pollen seasons.

Recent legislation allows physicians to prescribe marijuana to select patients. Allergic reactions subsequent to marijuana smoke exposure have been reported in rare patients.² It is however possible that allergic reactions to mar-

ijuana have been underreported by the general public due to the illegal nature of marijuana use.

Industrial exposure to Cannabis has been associated with respiratory symptoms as well.^{3,4} Cannabis workers with positive skin tests had significantly higher prevalences of chronic respira-

tory symptoms than those with negative skin tests.³ Furthermore, a water-soluble extract of Cannabis dust caused dose-related contraction of nonsensitized guinea pig tracheal smooth muscle when studied *in vitro*.³ These data suggest that Cannabis dust might cause respiratory symptoms by both IgE-dependent and IgE-independent mechanisms.

CONCLUSIONS

Overall, the data demonstrate the potential of Cannabis to cause respiratory symptoms. The ability to induce allergic sensitization, the significant pollination period, and the frequency of respiratory symptoms in sensitized individuals point to Cannabis as a clinically significant aeroallergen. Furthermore, unlike other weeds, the recreational, medicinal, and industrial use of Cannabis could also contribute to Cannabis-induced respiratory symptoms. Clearly, further studies are needed to assess the potential deleterious effects of Cannabis on respiratory health.

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