

Allergic Skin Test Reactivity to Marijuana in the Southwest

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In a general allergy consultation practice in Arizona and western New Mexico, 129 patients were tested for immediate hypersensitivity skin test reactivity to marijuana pollen and tobacco leaf, as well as to a battery of other antigens. In all, 90 patients were diagnosed as allergic (atopic) and, of these, 63 (70 percent) were found to be skin test reactive to marijuana pollen and 18 (20 percent) to tobacco leaf. The incidence of skin test reactivity to marijuana was not significantly different for persons living at low, middle or high elevations throughout the Southwest. Marijuana sensitivity occurred in patients who were, in general, also sensitive to a variety of other airborne plant pollens. There was no close correlation, however, between sensitivity to marijuana pollen and sensitivity to pollens from elm, mulberry, hop and stinging nettle, which are botanically related to marijuana. The data suggest that marijuana pollen may be a relatively common airborne pollen pollutant in the Southwest, allergic persons being sensitized through inhalation. If this is confirmed by further studies, then clinical investigation of marijuana hyposensitization (immunotherapy) may be warranted. This is in contrast to tobacco allergy for which simple avoidance is recommended.

In this study immediate allergy skin test reactions to marijuana (*Cannabis sativa*) pollen and tobacco leaf in a Southwest allergy practice (Arizona and western New Mexico) are reported. Interest in this subject arose because our population now smokes marijuana in addition to tobacco and also grows marijuana plants as illicit crops.

Results suggest that marijuana, a plant prevalent in the Southwest, has a highly allergenic pollen. Allergy to the pollen is common and management of this allergy may eventually require procedures that allergists currently use for other botanical species that produce a sensitizing windborne pollen, such as Bermuda grass, mulberry tree, juniper (mountain cedar) and Russian thistle (tumbleweed).

Methods

Consecutive unselected patients were tested who were seen in a referral practice from August 1980 to February 1981 in nonmetropolitan areas of Arizona and western New Mexico. Testing was done with a battery of allergens that included tobacco leaf (1:20 weight per volume [wt per vol] scratch glycerosaline and 1:

1,000 intradermal wt per vol aqueous solution, Greer Laboratories, Lenoir, NC) and the pollens from marijuana (*Cannabis sativa*) (1:20 wt per vol scratch glycerosaline and 500 protein nitrogen units [PNU] per ml intradermal aqueous solution, Hollister Stier Laboratories, Spokane, Wash), mulberry, elm, hop and nettle plants. Several patients were excluded for technical reasons, such as age younger than 6 years.

Test results, read at 20 minutes, were reported on a scale of 0 to 4 according to standard allergy practice,^{1(p258)} and borderline reactions were considered negative. Statistical tests for significance were made by χ^2 analysis.

Results

In all, 129 patients were studied, ranging in age from 6 to 66 years (82 female and 47 male subjects). Half these patients were adults between ages 19 and 39. Of the 129, there were 90 who were diagnosed as atopic (allergic) on the basis of positive immediate skin test reactions, usually to a variety of allergenic substances such as pollens, molds, house dust and animal danders, as well as an appropriate history or

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TABLE 1.—Skin Test Reactions to Marijuana Pollen and Tobacco Leaf in 129 Patients Studied

	Patients Tested		
	Male No.=47	Female No.=82	Total No.=129
Allergic patients	35	55	90
Marijuana pollen skin test positive ..	27	36	63
Tobacco leaf skin test positive	10	8	18

TABLE 2.—Skin Test Reactions to Marijuana and Other Related Botanical Pollens in 90 Allergic Patients

	Marijuana Skin Test	
	Positive N=63 Percent	Negative N=27 Percent
Hop skin test positive	49	19
Nettle skin test positive	27	4
Mulberry skin test positive	49	24
Elm skin test positive	53	22

examination (Table 1). These patients had allergic rhinitis, asthma, urticaria or atopic dermatitis or a combination of these. The remaining 39 had completely negative skin tests to all substances tested and were classified as nonallergic patients.

Of the 90 atopic patients, 63 (70 percent) had a positive skin test reaction to marijuana pollen and only 18 (20 percent) reacted to tobacco leaf. No patient reacted only to marijuana pollen or tobacco leaf (or both), supporting the concept that these substances in the concentrations used were neither histamine releasers nor irritants. Marijuana reactors also reacted to other plant pollens, never only to marijuana pollen.

A third of the allergic patients were current or past tobacco smokers; this was unrelated to whether tobacco leaf skin test was positive or negative (not significant at $P=.05$). There were no reliable data for marijuana use in these patients, nor was an attempt made to obtain this information. Patient exposure to marijuana plant pollen was unknown.

Only half the marijuana pollen reactors also reacted to hop, mulberry or elm pollen and only a fourth to nettle pollen (Table 2). Of the 27 allergic patients who did not react to the marijuana, one fourth reacted to elm or mulberry and less to hop or nettle pollen.

Geographic location within Arizona or western New Mexico at the time of testing did not correlate with reactivity to marijuana when patients were grouped according to low, middle and high altitudes (not significant at $P=.01$, data not shown). Most patients, however, had lived at least a year in a different geographic location and it is unknown where they were when the marijuana sensitivity developed. Several of the reactors had lived in only a single location.

Discussion

*Arizona Flora*² in more than 1,000 pages does not list marijuana as a native or imported growing plant in the state or in nearby New Mexico. Tucson news-

papers, however, have repeatedly reported seizures of plants by law enforcement agencies, as have news sources in other cities and towns, and suggest that marijuana growth is widespread. In July 1981 the public reporting of marijuana pollen in the daily aerial pollen counts began in Tucson (*Arizona Daily Star*, Tucson, July 17, 1981, p 4A). That marijuana is widely grown in the United States is an accepted fact; the profitable marijuana crop in northern California, for instance, has been estimated at more than \$1 billion yearly (*People Weekly Magazine*, 1982 Mar 10; 17:26-28).

The plant order Nettle contains hemp (marijuana) as a family with only one member. Other families in the same order contain hop, nettle, mulberry and elm trees.^{3(p510)} Elm and mulberry trees are abundant in many Arizona and New Mexico communities. Wild hop is uncommon but reported in high mountain woods and some nettle grows along water courses.² All are windborne-pollen producers, potentially responsible for allergic symptoms in sensitized persons. The fine light pollen of marijuana microscopically resembles nettle. This pollen does not settle well onto open slides used for pollen counts; special procedures (volumetric counters) may be used. Wild tobacco grows throughout the regions in roadside ditches but does not produce a windborne pollen.

Information on skin test reactivity and allergy symptoms from tobacco has been published.⁴⁻⁶ Anywhere from 8 percent to 64 percent of all persons skin tested to tobacco leaf in past studies had positive reactions, occurring in smokers and nonsmokers, but testing methods used are not comparable between studies. Assessing allergic symptoms from tobacco exposure is difficult because the smoke may be an irritant for many allergic persons and is often disliked. Several cases of true allergic (IgE-mediated) reactions have occurred in tobacco plant production workers.⁷

In contrast, there is little information on skin test results or clinical allergy to marijuana, perhaps because it is an illegal substance but also because allergists do not include it in the general battery of tests. In the Midwest where marijuana grows wild, physicians have gathered unpublished findings of positive skin test reactions to the pollen, and this has been considered a possible cross-reaction to nettle, hop or some other related substance (Robert A. Stier, MD, written communication, July 8, 1980).

All parts of the marijuana plant are smoked or ingested as a recreational drug. Irritating bronchial and central nervous system effects from marijuana use have overshadowed its weak but definite prolonged bronchodilator effect in asthma (by smoke or ingestion) that otherwise might be useful.^{8,9} There are several recorded cases of asthma and anaphylaxis from marijuana smoking.¹⁰

Elevated IgE levels are reported in sera from both tobacco and marijuana users¹¹ but other general immunologic abnormalities have not been found.¹²

In our patients sensitivity to marijuana pollen was

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three times as common by skin test as to tobacco leaf in the allergic persons. This finding suggests that marijuana pollen is highly sensitizing; that marijuana skin test reactivity is not a cross-reaction to closely related mulberry, elm, hop or nettle pollen, and that marijuana pollen is not an irritant or histamine releaser in the skin test procedures used. The reactions to marijuana were not related to patients' sex or the altitude at which they lived, which affects plant distribution.

No reliable histories were obtained for marijuana use in these private patients on this sensitive issue. Any relationship between exposure from use of the marijuana plant as a recreational drug and that from inhaling the airborne pollen is unknown. Some anecdotal information was given by many that suggested widespread growth of the plants in many communities of the area.

Pollen counts for marijuana will need to be looked at in all communities to determine its presence in the air. It is possible that the pollen may produce sensitization in some allergic law enforcement agents exposed at work. One worker was quoted as follows: "It's miserable to work around. . . . Some people come in here and get runny noses or their skin breaks out because they have allergies" (*Arizona Daily Star*, Tucson, August 22, 1980, p 1B). Local monitoring of the pollen in the air in the summer pollinating period might identify the sites within communities where it is being grown and thus be of importance in law enforcement.

The primary importance of marijuana to an allergic patient is probably in its presence as a crop that produces the sensitizing airborne pollen and thus is potentially responsible for some allergic asthma and rhinitis.

This is in contrast to tobacco in which the health hazard to allergic persons is from working in tobacco factories, from smoking and possibly from passive exposure to smoke. If an allergic person lives where marijuana is grown and becomes sensitized to its pollen, it may be appropriate eventually to give treatment with immunotherapy (hyposensitization) injections, just as treatment is given now for other local pollens. This treatment consideration will require further studies that evaluate the presence of airborne marijuana pollen in communities, its correlation with patient symptoms and, by reproducing the symptoms, establish that the pollen can produce allergies.

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