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# Oral corn pollen hypersensitivity in Arizona native americans: some sociologic aspects of allergy practice

Geraldine L. Freeman, MD

*Thirty-three Navajo patients were seen in a private allergy consultation practice in Flagstaff, Arizona between 1978 and 1990. Sufficient skin test and historical data were available from nine atopic patients to evaluate hypersensitivity reactions to oral corn pollen used in the Navajo ceremonials. Six of the nine patients had positive skin test reactions to corn pollen and four of these six reported symptoms from oral corn pollen. The symptoms included various combinations of oral and ear itching, sneezing, cough, and wheezing. One corn pollen skin test-negative patient reported slight throat itching from the pollen. In no case did the patient or referring primary care physician associate the symptoms with ceremonial oral corn pollen use.*

*This is the first report of hypersensitivity reactions to the ceremonial use of oral corn pollen in native Americans.*

## INTRODUCTION

Corn is the traditional basic food staple of native Americans and is accordingly central to their social, cultural, and religious practices. Orally administered corn pollen (tadiiin in the Navajo language), obtained from locally grown corn, is used commonly by these peoples in a variety of ceremonies.<sup>1</sup>

Interest in possible hypersensitivity responses to oral corn pollen was initiated by a young Navajo girl seen in consultation with allergic symptoms following ceremonial corn pollen ingestion. Accordingly, the following study of possible hypersensitivity reactions to ceremonial oral corn pollen in a group of Navajo was undertaken.

## PATIENT POPULATION

The study population comprised Navajo patients seen as part of a private allergy practice in Flagstaff, Arizona from 1978 through 1990. The Navajo population in this area is estimated to be 150,000. All patients lived in isolated rural or semi-rural areas in northeastern Arizona

at elevations ranging between 5,000 and 7,000 feet. After the propositus case, data were collected prospectively on corn and other pollen skin tests and historical information sought on ceremonial use of corn pollen and any attendant untoward reactions. In addition, charts of patients seen prior to the propositus were reviewed for pertinent information and attempts were made to fill in lacking data by return clinic visits or by personal communication.

Thirty-three Navajo patients were seen for allergy consultation and sufficient skin test and historical data were obtained from nine of these patients to explore the occurrence of hypersensitivity reactions to ceremonial oral corn pollen.

## SKIN TEST PROCEDURES

Patient evaluation for inhalant allergy included a panel of grass pollen prick skin tests dependent on the location and elevation of the patient's home (Bermuda, Kentucky Blue, brome, fescue, grama, Johnson, perennial rye, western wheat, and barley). All were tested with corn (food) antigen (1:10 wt/vol) by prick technique. Some had been prick tested with corn pollen (*Zea mays*) (1:20 wt/vol). Extracts were in 50% glycerosaline from

Greer Laboratories, Lenoir, NC. Histamine (histamine phosphate 2.75 mg/mL) and diluent prick controls were used. Patients had received no antihistamines for 72 hours prior to testing.

Tests were graded by comparison with the histamine control on each patient to minimize interpatient variability of histamine responses.<sup>2</sup> Measurements were made of average diameters of wheal and erythema and comparably sized allergen skin test responses were graded 2+. Those twice the size of the histamine test were 3+ and smaller reactions were 1+. Patients were classified as atopic if two or more allergy skin tests were as positive as the histamine control and there was a compatible history.

## PROPOSITUS

(Table 1, patient 6). A 4-year-old Navajo girl was referred in 1989 by her reservation pediatrician for evaluation of asthma requiring hospitalization, recurrent pneumonias, and rhinitis.<sup>3</sup> The child was brought in by the grandparents who provided the history. The mother had asthma. The child lived in a rural location at a 6,000 feet elevation in a trailer that previously housed cats, and contained an old mattress plus locally made sheep wool rugs. Ashes

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Table 1. Skin Test Responses to Corn Pollen Antigen and Symptoms Following Oral Corn Pollen

Patient	Age, yr/ Sex	Prick Skin Tests		Oral Corn Pollen Symptoms/Use
		Corn*	Grasses†	
1	52/F	3+	+	Sneezing, oral and ear itching/stopped use
2	34/M	3+	+	No symptoms
3	37/M	3+	+	Slight itching throat, ears
4	34/M	3+	+	Oral itching/continues use 5x annually
5	34/F	2+	+	No symptoms/weekly use
6‡	4/F	2+	+	Sneezing, cough, wheeze
7	39/F	0	0	No use (family corn field)
8	36/F	0	+	No symptoms/use 4x annually
9	39/F	0	0	Slight throat itch

\* Size of skin test response.

† Presence (+) of skin test reactivity to any of the following grass pollens: Bermuda, Kentucky blue, brome, fescue, grama, Johnson, rye, western wheat, barley. Absence (0) of skin test reactivity to all grass pollens tested.

‡ Previously described.<sup>3</sup>

from juniper wood burned outdoors were brought indoors occasionally for ceremonials. Prior studies showed no evidence of hypersensitivity pneumonitis or immunoglobulin deficiency and the tuberculin skin test was negative. On examination the lungs were clear and the nasal membranes were slightly pale and boggy.

Prick skin tests were 3+ peanut (food) and 2+ each to brome grass, western ragweed, cat dander, and corn pollen. When the positive corn pollen skin test was called to the grandparents' attention they then recounted that corn pollen had been placed in her mouth for ceremonial purposes during an automobile ride several minutes before an acute episode of cough, wheeze, and sneezing. They had attributed the episode to the child's Cabbage Patch doll which they then discarded. A new Cabbage Patch doll was later given to the girl with no untoward effects.

## RESULTS

Twenty-three of the 33 Navajo patients were found to be atopic as defined above. Sufficient skin test and historic data were available in nine of these patients to evaluate the

occurrence of hypersensitivity reactions to ceremonial oral corn pollen (Table 1).

Six of the nine patients showed positive skin test responses to corn pollen and the corn pollen test was never positive in the absence of reactions to grasses and never smaller than the histamine control. Four of these six patients reported symptoms associated with oral corn pollen. These symptoms included various combinations of mouth itching, ear itching, sneezing, cough, and wheezing. In patient 3 the symptoms were slight and she had noted similar, more severe symptoms from melon, avocado, and banana.

One of the three corn pollen skin test-negative patients (patient 9) reported a slight throat itch from the oral pollen. No patient reported symptoms from eating corn and all corn food skin tests were nonreactive.

Patients 7 and 9 were negative to both corn and grass pollens. They were judged to be atopic however on the basis of reactions to poplar and cottonwood tree pollens (patient 7) and to several juniper species (patient 9).

## DISCUSSION

Corn (*Zea mays*), a cereal grain, is a separate tribe (Maydeae) of the grass family (Graminae)<sup>4</sup> and is believed to have been cultivated in the New World prior to the explorations of Columbus.<sup>5</sup>

Corn is the traditional basic food staple of the native Americans and accordingly it and its pollen play a central role in their customs and religious practices. Ceremonials involving corn pollen, such as the "Blessingway" rites, were developed early in tribal life to keep the members safe and healthy.<sup>1</sup> In various ceremonies corn pollen is placed on the tongue or sublingually, eaten as well as sprinkled on the palms, soles, head, and on inanimate objects.

In this study four of six corn pollen skin test-positive patients reported upper and lower respiratory tract symptoms associated with oral corn pollen use. One of three skin test-negative patients also reported mild symptoms after corn pollen use. While two of six corn pollen skin test-positive patients were asymptomatic after pollen use, this lack of correlation is not unusual and is noted particularly in individuals who consume foods with impunity to which they are reactive by skin test criteria.<sup>6</sup>

The range of symptoms recorded here in the corn pollen users is similar to those occurring with oral use of other pollen products, notable from the Compositae family. Bee pollen of dandelion<sup>7</sup> and mesquite<sup>8</sup> sources; chamomile tea,<sup>9</sup> which cross-reacts with several pollens; and sunflower honey (contaminated with pollen)<sup>10</sup> are all reported to have produced reactions including anaphylaxis.

Corn pollen sensitivity can result from either ingestion and possibly inhalation. Similarly, compositae pollens sensitize when ingested as bee pollen or inhaled as ragweed pollen. In addition chamomile applied as a local eyewash causes severe allergic conjunctivitis.<sup>11</sup>

A grasses-maize pollen antigen

mix administered orally as drops as an immunotherapeutic agent was tested in a study in South Africa.<sup>12</sup> The antigen was held in the mouth for one minute and then swallowed. The only side effect reported by the recipients was mild itching of the tongue and lips occurring within several minutes of the administration. The capacity of this corn pollen-containing antigen to produce untoward allergic symptoms cannot, however, be compared directly to the undiluted raw corn pollen used in native American ceremonials.

If the corn pollen skin test was positive in this study the patient was advised of the potential consequences of the allergic reactions. Because of the importance of corn pollen in their customs and religion, care was taken to explain the relative merits and risks of avoidance, prophylaxis, and treatment modalities. All patients elected to forego the ceremonial use of corn pollen with the exception of patient 4 who indicated that he would continue the practice without medical intervention.

The data reported herein document that allergic symptoms can result from the oral application of

corn pollen used in religious and cultural ceremonies by native Americans. In no case was the association between the pollen use and subsequent symptoms perceived either by the patients or their referring physicians. This study suggests that for the effective delivery of health care in our pluralistic society it is necessary for the physician to be sensitive to the social, cultural, and religious customs of the minority groups in his or her care.

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