

Occupational Allergic Rhinitis Reaction to Psyllium

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We report studies that document a specific rhinitic reaction that developed as a result of occupational exposure to a psyllium-based powdered laxative. This nurse had a nonatopic family history, personal evidence of atopy (skin test reactions to pollen, cat dander, and house dust), and a significant elevation of antipsyllium IgE. Measurements of nasal and lower airway resistance documented only nasal obstruction to brief inhalational challenge to the laxative. Symptomatic relief was achieved with prior treatment with cromolyn. We suggest that nasal airway challenge can document and assess treatment for occupational rhinitis.

Although atopic persons may be uniquely susceptible to transmucosal sensitization, it appears that, under appropriate circumstances, otherwise nonatopic persons may suffer respiratory consequences of various inhaled chemical antigens. The present case report focuses on a specific rhinitic reaction which developed as a result of occupational exposure to a potential inhalational sensitizer.

Case Report

PR, a 45-year-old woman, has worked as a nurse in a skilled health care facility for 12 years. Within the recent past, she noted the onset of sneezing, runny nose, water eyes, postnasal drip, headache, itching and fullness in the ears, cough, chest tightness, and wheezing on the days she distributes Metamucil, a powdered laxative, which contains psyllium. The patient was self-

referred for allergy consultation after she suffered "gastroenteritis" following use of Metamucil for constipation. Her symptoms included severe cramping, abdominal pain, and nausea, which she believed to be a reaction to the drug.

Nasal symptoms occurred exclusively at work. The symptoms were absent on days she was off duty or when she had no exposure to Metamucil. To continue in her occupation she has used Opticrom and Nasalcrom with self-reported good success. On days with especially heavy exposure to Metamucil, she may also use a face mask while distributing the drug. She denied any personal history or any family history of any allergic disease. However, she did report generalized hives after receiving parenteral penicillin for a respiratory infection 10 years prior to presentation.

Physical examination results were normal except for the presence of slight bilateral conjunctivitis and swollen nasal mucous membranes.

Laboratory studies included routine allergy skin testing, which revealed positive immediate reactions to ragweed pollen, cat dander, and house dust. A total serum IgE was elevated at 937 units (normal: less than 100 units) and a radioallergosorbent assay revealed a significant titer for antipsyllium IgE of 558 units (normal: less than 150 units). Baseline spirometric values were within normal limits.

Provocative studies were carried out in the airway challenge laboratory. Studies were done on three separate occasions, 1 month apart, and will be designated as Day A, Day B, and Day C. On each occasion, the patient underwent baseline measurement of nasal airway resistance, spirometry utilizing a Collins Eagle II Survey Spirometer, and body plethysmography. The work exposure was simulated by having the patient pour Metamucil powder from one container to another, just as she would do when measuring out this drug for patients, for five minutes. Exposures were carried out on Days A and B. A sham exposure was performed on Day C. Measurements of airway function were carried out 1, 5,

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10, 15 or 20, and 30 minutes following challenge. In addition to these objective measurements, the patient's subjective responses were recorded.

Methods

A sample of Metamucil was obtained from the pharmacy serving the health care facility.

Transnasal pressure and bulk flow were measured by posterior rhinometry by a method previously described.¹ Measurements were made with the patient in the seated position. Twenty seconds of data were recorded, during which the subject made inspiratory and expiratory efforts of varying magnitude through the nose at a rate of 0.2 to 2 Hz. Data were collected using submaximal efforts at flows where no flow limitations were apparent. We obtained the pressure at an inspiratory flow rate of 0.4 L/s as a representative value,² consistent with that recommended by the International Committee on Standardization of Rhinomanometry.

Specific airway resistance was monitored by body plethysmography. The subject sat in an airtight box wearing noseclips while breathing through the mouth. Three measurements of airway resistance were obtained at each interval and the result was reported as an average of these values.

Spirometric measurements, including forced expiratory volume in 1 second, were made using a Collins Eagle II Survey spirometer.

Results

On Day A, the patient developed symptoms two minutes after the start of Metamucil exposure, with paroxysmal sneezing, nasal congestion, cough, and red, watery eyes. Although sneezing stopped shortly after the removal of Metamucil, other symptoms persisted, including chest congestion, nasal congestion, and "cold-like" symptoms for two days. The airway data are presented in Table 1 and show that there was a significant increase in nasal airway resistance two minutes after exposure, which persisted for at least 30 minutes and was not accompanied by a decrement in pulmonary function.

A repeat exposure (Day B) was conducted as on Day A but, in addition, the patient was pretreated with two

sprays of nasal cromolyn in each nostril, two drops of Opticrom in each eye, and five puffs of cromolyn sodium inhaler before challenge with Metamucil as on Day A. As before, no significant changes in pulmonary function were observed. Less acute upper airway symptoms developed as compared with the first exposure, and symptoms did not persist over succeeding days. Although demonstrating a significant and persistent change in nasal airway resistance, it was less severe than on the first exposure (Table 2).

A sham exposure was carried out in the same fashion as that described for Day A, but without exposure to Metamucil (Table 3). The subject reported to the laboratory at the same time of day. Observation over time was not associated with clinical symptoms, or a change in pulmonary function. Measurements of nasal airway resistance revealed changes that were smaller in relative magnitude than on Day A or Day B.

A graphic summary of results from the three trial days is shown in the Figure. Results are expressed as a percent of baseline measurements (Days A and C) and percent of postcromolyn prechallenge measurements (Day B) of nasal resistance. With Metamucil challenge, nasal resistance increased >350% from baseline. There was substantial variation on the pretreatment trial (Day B) and on the sham day (Day C); however, the degree of nasal obstruction on both days was substantially less than on Day A.

Discussion

Airway hypersensitivity to chemicals encountered in an occupational setting can be a frustrating clinical problem. Oftentimes, such patients are regarded as

TABLE 1
Test Results: Day A

Time	NAR*	% Baseline	SRAW†	% Baseline	FEV ₁ ‡	% Baseline
Baseline	1.58	100	5.22	100	3.33	100
Post 2 min	6.40	405	5.44	104	3.24	97
Post 5 min	9.17	580	6.05	116	3.24	97
Post 10 min	6.46	409	6.47	124	3.16	95
Post 15 min	6.40	405	6.53	125	3.24	97
Post 30 min	5.39	341	6.17	118	3.24	97

* NAR, nasal airway resistance.

† SRAW, specific airway resistance.

‡ FEV₁, forced expiratory volume in 1 second.

TABLE 2
Test Results: Day B

Time	NAR*	% Baseline	% Post-cromolyn†	SRAW‡	% Baseline	% Post-cromolyn	FEV ₁ §	% Baseline	% Post-cromolyn
Baseline	1.74	100		6.15	100		3.27	100	
Post meds	3.10	178		5.86	95		3.36	103	
Post 5 min	9.24	531	100	5.28	86	100	3.31	101	100
Post 10 min	5.66	325	183	5.00	81	85	3.23	99	96
Post 15 min	7.53	433	243	6.09	99	104	3.31	101	99
Post 30 min	6.30	362	203	5.63	92	96	3.36	103	100

* NAR, nasal airway resistance.

† Indicates percentage of post-cromolyn prechallenge measurements.

‡ SRAW, specific airway resistance.

§ FEV₁, forced expiratory volume in 1 second.

TABLE 3
Test Results: Day C

Time	NAR* % Baseline	SRAW† % Baseline	FEV ₁ ‡ % Baseline
Baseline	1.31	100	5.33
Post 5 min	3.12	231	—
Post 10 min	1.47	109	5.63
Post 15 min	—	—	5.52
Post 20 min	1.76	130	—
Post 30 min	3.12	231	5.28

* NAR, nasal airway resistance.

† SRAW, specific airway resistance.

‡ FEV₁, forced expiratory volume in 1 second.

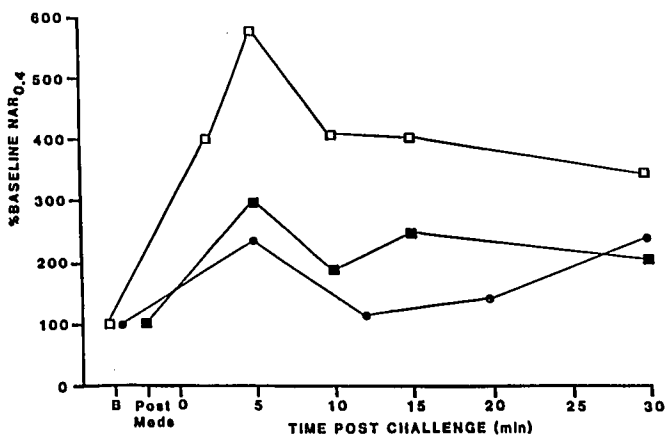


Figure. Relative changes in nasal resistance expressed as a percent of prechallenge baseline values on each of the two challenge days. Day A, Metamucil (□); Day B, cromolyn before Metamucil (■); Day C, sham challenge (●).

malingerers and recognition is further hampered by a lack of technology with which one can assess objectively the basis of their complaints. It has become apparent that a significant number of health care workers complain of clinical symptoms on preparing psyllium laxatives for patients, with up to 18% of 735 surveyed workers complaining of sneezing and 3% of 717 responders having wheezing or shortness of breath.³

In another study,⁴ five nurses were examined for occupational allergy and were found to have positive assays for IgE antipsyllium antibodies and asthma. All, however, had evidence of other preexisting allergic respiratory problems. Although Ascher⁵ first reported rhinitis and gastrointestinal symptoms in a pharmaceutical worker upon exposure to ground psyllium seed, there have been no laboratory studies documenting changes in nasal function as described here.

In cases of asthma and anaphylaxis, skin testing and in vitro methods support a role for IgE mediation of the reaction.^{6,7} Indeed, in a study of asthma and IgE sensitization to psyllium in a pharmaceutical company, Bardy et al⁷ observed that 19% of workers had positive skin

tests and 26% had IgE antibodies. Also, as in this case, there was a significant association between atopy, IgE sensitization, and occupational airway symptoms. While Bardy et al⁷ described itchy or watery eyes, sneezing, and runny or stuffy nose at work in a significant number of workers, studies of nasal function were not carried out.

The current case demonstrates the association of nasal airway symptoms with signs of nasal obstruction after challenge with Metamucil, a therapeutic agent with which many nurses must work. The studies clearly show that this patient had significant decrements in nasal function following challenge, in the absence of changes in intrathoracic airway resistance as measured by body plethysmography and spirometry. Measurements done following sham challenge showed no similar pattern. In addition, pretreatment with cromolyn resulted in a reduction in symptoms and an amelioration of the nasal airway resistance in response to Metamucil challenge. We attribute the effect of cromolyn to its ability to alter activation of mast cells or release of inflammatory mediators.⁸

We suggest that nasal airway challenge testing can be helpful in the clinical assessment and documentation of the effectiveness of interventions directed at management of occupational rhinitis.

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