

Respiratory Symptoms in Ispaghula-Allergic Nurses after Oral Challenge with Ispaghula Suspension

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Ispaghula powder, which is used as a component in bulk laxatives, is known to induce allergic reactions when inhaled by occupationally exposed persons. We have tested whether nurses sensitized by inhalation could get allergic symptoms when challenged by eating ispaghula. Of six nurses tested, all developed symptoms from the airways, one of them even pronounced ones requiring treatment. In all cases the dose required to produce symptoms was below the single dose of ispaghula used as a laxative.

Keywords: irritant allergen, ispaghula, occupational allergy, oral challenge

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Some allergens can cause allergic reactions both when inhaled and when taken by mouth. Patients allergic to birch pollen can experience itching in the mouth and throat by eating allergens cross-reacting with birch allergens, e.g. apples and nuts. Food allergens can also cause reactions when inhaled, as is the case with very potent fish or white potato allergens.

Ispaghula powder was introduced in the fifties as a bulk laxative because of its hygroscopic properties. Workers in the pharmaceutical industry and nurses can be sensitized by inhaling the powder when handling such products (1, 2, 5). Surprisingly, there are no reports about patients having been sensitized when eating ispaghula for therapeutic reasons.

The effect of orally administered ispaghula on ispaghula-sensitive subjects was studied in six volunteers. The report presents part of the results obtained in this investigation, performed mainly to study the uptake of allergen from the intestinal tract.

MATERIAL AND METHODS

Six nurses working in geriatric wards were tested. All had histories of bouts of rhinoconjunctivitis and/or asthma when handling ispaghula products. They were found to be allergic to ispaghula as demonstrated by positive reactions in RAST (Phadebas RAST, Pharmacia, kindly performed by Prof. S. G. O. Johansson, Karolinska Hospital, Stockholm), skin tests and exposure tests. None of them had eaten ispaghula products before this study.

During the exposure test the subjects sat in a provocation cabin and poured 50 g of ispaghula powder or placebo (iron fumarate coloured lactose) from one disposable bowl to another for 5 min. PEF (peak expiratory flow) was checked before, immediately after and 15 min after the challenge. Symptoms appearing during and after the test were recorded. This part of the investigation was performed as a double blind controlled study.

After an interval of at least 1 month, the exposure test was followed by an oral challenge.

An ispaghula suspension in water was freshly prepared in a room separated from the testing room. The provocation was performed by giving increasing amounts of this suspension to the subjects. Doses of 0.1 g, 0.5 g and 2 g were taken at intervals of 30 min. The challenge was stopped if pronounced symptoms appeared.

A control group of six persons without allergic symptoms and with negative RAST and prick-tests to ispaghula were tested in the same way. All tested persons were in good health and had been free from symptoms for at least 2 weeks before the tests. Blood samples were taken before the test, and 2 and 8 h after the challenge.

Blood leukocytes and eosinophil granulocytes were counted.

RESULTS

The main symptoms appearing during and after the pouring of ispaghula powder occurred from the upper respiratory tract (Table 1), but some of the tested persons also developed eye, ear and skin symptoms. Three of them became broncho-obstructive. No significant symptoms appeared after pouring placebo.

After eating ispaghula, all six ispaghula-sensitive persons tested developed some kind of symptom (Table 2). In two cases the test had to be stopped after the 0.5 g dose, i.e. after a total amount of 0.6 g. In each of the other four subjects a total of 2.6 g could be given.

In three of them the first symptoms appeared after the lowest dose and in the other three after the second one. Generally, symptoms appeared 15 to 25 min after each administration.

Table 1
Symptoms after exposure to ispaghula dust

Patient	RAST	Itching (skin)	Rhinitis	Cough, wheezing	Abdominal pain, nausea	Rash
1	2	++	+++	-	-	-
2	3	-	+++	-	-	-
3	4	+++	+++	++ (10)	-	-
4	4	+++	+++	+++ (30)	-	+
5	3	-	+++	+++ (50)	-	+
6	4	+++	+++	-	-	-

-: no symptoms; +: slight symptoms; ++: moderate; +++: pronounced.

Numbers in parentheses show decrease in PEF values (%) 15 min after challenge.

Table 2
Symptoms after oral challenge with ispaghula suspension

Patient	Itching (nose, throat, ears)	Rhinitis	Cough, wheezing	Abdominal pain, nausea	Rash
1	++	++	-	-	-
2	+	+	-	-	-
3	++	++	+	-	-
4	+++	+++	+++ (22)	+++	+++
5	+	+	+	++	++
6	++	++	-	-	-

-: no symptoms; +: slight symptoms; ++: moderate; +++: pronounced.

Numbers in parentheses indicate decrease in PEF values (%) 30 min after challenge.

all the subjects reacted with respiratory symptoms such as rhinitis and sneezing. Two of them also had broncho-obstructive symptoms, i.e. dyspnea and wheezing. Itching in the ears, mouth and throat, as well as abdominal pain and nausea, were common complaints. Two persons had a cutaneous rash and itching and one person had a single loose stool. None had genuine diarrhea. Almost all subjects still had symptoms many hours after the challenge. Only subject No. 4 was sufficiently ill to require medical treatment – for asthma, rhinoconjunctivitis and angioedema.

No significant changes in the eosinophil or leukocyte counts were observed. None of the members of the control group reacted with symptoms after oral challenge.

DISCUSSION

A considerable amount of an inhalant allergen that is introduced into the upper airways is swallowed (8) and, theoretically, is able to gain access to the blood by this route. The amounts of allergen inhaled in a bronchial provocation test or in a natural environment seem to be too small to give rise to any allergic symptoms when swallowed (6).

The situation is quite different, however, when an inhalant allergen or a substance antigenically related to such an allergen is also a constituent of a food or other edible product. This is the case with ispaghula powder, which is eaten for therapeutic reasons in much higher quantities than those which could ever be inhaled when the powder is handled. Patients eating pollen as constituents of health food products can get allergic manifestations in different parts of the body (3). It is well known that intact macromolecules and antigenically intact breakdown products are taken up by the blood via the intestinal mucosa (9, 4). It has also been reported (7) that food allergens can give rise to symptoms in the airways when eaten. To our knowledge few data are available concerning the occurrence of respiratory tract symptoms on oral ingestion of inhalant aller-

gens. In our study all subjects developed symptoms from the upper airways after eating ispaghula powder, and two out of six also showed broncho-obstruction. All the test persons had high RAST class (Table 1), but there was no obvious correlation between RAST and symptoms. There is a remarkable correspondence between the symptoms observed after inhalation and after oral challenge. Symptoms from the gastrointestinal tract only appear, however, after oral administration. It is conceivable that macromolecules entering the organism via the gastrointestinal tract might elicit allergic reactions in other parts of the body by different mechanisms. Firstly, the allergen could react in the intestinal wall and produce or liberate mediators which could travel to the target organs via the blood stream. Secondly, the macromolecule could enter the blood and there give rise to active mediators. Thirdly, the allergen could be transported by the blood and itself react with components in the target tissue. It is not possible with the present knowledge to decide which theory is the correct. The mechanism might even be a combination of the three.

We have developed a method to measure ispaghula allergen in blood. The results of such measurements on blood samples from the present study will be published later.

For practical purposes it is important to note that the nurses tested did develop symptoms, and in one case even severe ones, by eating 2.6 g of ispaghula, while the standard single dose for clinical purposes is 3–4 g.

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