

# Occupational Allergy in Nurses to a Bulk Laxative

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Finely ground psyllium (*Plantago ovata*) seeds, so-called ispaghula powder is used in bulk laxatives. During the dispensing of these medicines some dust is generated. Allergic symptoms from exposure to this dust was reported by two nurses, one of whom was working in a department where exposure to the powder could be considered high. Nineteen other subjects working in the same department were investigated with regard to allergy to ispaghula powder.

An extract from ispaghula powder was made and used in RAST and skin tests. Exposure tests with ispaghula powder mixed with crushed rusks were made in symptomatic subjects. Eight out of the 20 investigated subjects from this department reported symptoms which could possibly have been elicited by ispaghula powder. Evidence of sensitization was found in five of them.

The use of less dusty (granulated) forms of ispaghula laxatives might diminish the risk of sensitization.

*Key words:* allergen; drug hypersensitivity; nursing staff; occupational disease; psyllium, adverse effect; respiratory hypersensitivity.

*Accepted for publication 8 September 1978*

Exposure to airborne dusts containing proteins may cause sensitization and allergic symptoms especially in atopic subjects (6, 11). The risk of developing disease is greater when exposure is high as is often the case in an occupational environment (6). Occupational allergic diseases seem to have increased as a result of the production and introduction on the market of an increasing number of potentially hazardous products, e.g. isocyanates and detergent enzymes (6, 8).

One of these new substances introduced in the fifties is ispaghula powder, which consists of finely ground *Plantago ovata* (psyllium) husks or seeds (4, 5, 9). Ispaghula powder is used in bulk laxatives and because of its hydrophilic properties it retains intestinal fluids. Three laxatives containing ispaghula: Vi-Siblin®, Metamucil® and Lunelax®, are used in Sweden. These products are comprised of dried epidermis from *Plantago ovata*: 60% (Vi-Siblin), 49% (Metamucil), 50%

(Lunelax) together with saccharose, sodium chloride, colouring, glucose, lactose, potassium phosphate, sodium hydrogen carbonate and benzyl benzoate.

In 1977 two nurses sought medical advice at the allergy section of the lung department because they experienced symptoms of rhinitis and eye-itching at work, especially when dispensing medicines. Both nurses suggested that their symptoms were caused by Lunelax powder. This suspicion was strengthened by a positive immediate prick-test response in both cases to freshly prepared extract of Lunelax powder in a small amount of Coca's solution.

## CASE HISTORIES

*Patient A* is a 39-year-old nurse. She had no allergic diseases as a child, but in recent years she developed symptoms of nasal congestion, sneezing and eczema on exposure to house dust.

After working about 6 months in a geriatric department she experienced symptoms of sneezing and nasal congestion not only when dispensing medicines, but also as soon as she entered the medicine dispensary.

An allergy to ispaghula powder was later confirmed by a strongly positive RAST and prick-test and a positive challenge test.

*Patient B* is a 39-year-old part-time nurse at a geriatric department in a mental hospital. She has had a high exposure to psyllium seed dust as a double-blind comparison between Lunelax and Vi-Siblin in powder form had been carried out in her department for about 4 months. She experienced severe symptoms of nasal congestion, sneezing and ocular pruritus when she entered the area where psyllium was placed or when she dispensed medicines. The intensity of her symptoms was reduced on her time off and she was symptom-free during her vacation.

We wanted to find out if further personnel at the department where the clinical investigation of Lunelax and Vi-Siblin had taken place had been sensitized, and also to confirm a diagnosis of psyllium allergy by provocation tests and RAST.

## MATERIAL AND METHODS

Twenty subjects (including patient B, see above) working in the department where the clinical investigation of Lunelax and Vi-Siblin had taken place were investigated. All subjects had prepared the bulk laxatives and dispensed them to many patients in the department.

The subjects comprised 8 men and 12 women, their ages ranging from 20 to 61 years with a mean of 32 years. They were interviewed and asked to fill in a questionnaire regarding familiar and previous own allergic diseases and possible symptoms when handling the laxatives.

An extract (10 g/l) was prepared from pure ispaghula powder (a gift from DRACO-AB, Sweden) in Coca's solution. It was not possible to prepare a solution containing 100 g of ispaghula powder because of its high hydrophilic properties. This extract was coupled to filter paper discs and used in the RAST in which also an immunosorbent purified anti-IgE with DE<sub>2</sub>-specificity was used (3). Extract preparation and RAST were

kindly performed by Prof. S. G. O. Johansson.

Prick-tests were made with the same extract in the concentrations 1/100 and 1/1,000 (w/v) with a tuberculin needle as described by Pepys (10).

All subjects reporting symptoms after exposure to the laxatives or with a positive prick-test were submitted to a challenge test during which the patient sat in a dressing cubicle measuring about 1.5 × 1.5 m and poured a mixture of crushed rusks and laxative powder from one disposable bowl to another for 15 min. The challenges were made with a mixture of 10 g Lunelax powder and 90 g crushed rusks. In the placebo challenges 100 g of crushed rusks were used.

A control group of 20 subjects with allergic symptoms but without symptoms of ispaghula hypersensitivity were prick-tested with both allergen concentrations.

## RESULTS

Eight of the 20 subjects reported symptoms which could be ascribed to dispensing of bulk laxatives (Table 1). The others (not included in the Tables) had no symptoms at all. Four of the subjects (nos. 1, 2, 3, 8) had symptoms of an atopic type with rhinitis, sneezing and/or conjunctival itching. Two of them (nos. 2 and 3) also had skin symptoms with itching of the hands and face. Four subjects (nos. 4, 5, 6 and 7) had more unspecific symptoms, mainly itching of the skin when handling the ispaghula powder. One of these subjects (no. 5) also had itching of the eyes. Two of the eight subjects (nos. 3 and 5) had previous allergic diseases, i.e. bronchial asthma and prurigo Besnier, respectively, and could therefore be considered atopics. Two other subjects with symptoms (nos. 1 and 6) had atopic diseases in the family (children and siblings).

Of the 12 subjects with no symptoms only one had previous allergic disease. No one reported allergic disease among close relatives. All these subjects had negative skin

Table 1  
Summary of reported symptoms from handling laxative powder

| Subject | Age | Sex | Symptoms         |            |          |                 |                               |      |
|---------|-----|-----|------------------|------------|----------|-----------------|-------------------------------|------|
|         |     |     | Nasal congestion | Rhinorrhea | Sneezing | Ocular pruritus | Itching of the hands and face | Rash |
| 1       | 38  | W   | ++               | +++        | +++      | ++              | —                             | —    |
| 2       | 61  | M   | —                | +          | +        | ++              | ++                            | —    |
| 3       | 35  | W   | —                | ++         | ++       | +               | +++                           | +++  |
| 4       | 27  | W   | —                | —          | —        | —               | —                             | +    |
| 5       | 26  | M   | —                | —          | —        | +               | ++                            | ++   |
| 6       | 25  | W   | —                | —          | —        | —               | +                             | —    |
| 7       | 36  | W   | —                | —          | —        | —               | +                             | +    |
| 8       | 33  | W   | —                | —          | +        | +               | —                             | —    |

The symptoms were arbitrarily graded as slight, + (noticeable but not inconvenient); moderate, ++ (caused some irritation but did not hinder patients working with the laxatives); severe, +++ (interfered with their capacity to work).

test and RAST to ispaghula extract. The result of the immunological investigation in the eight subjects with symptoms is summarized in Table 2. Five subjects had a positive prick-test to ispaghula extract and

three of them also had a positive RAST. In four subjects the challenge test reproduced the same symptoms as previously reported in their case histories (nos. 1, 2, 3 and 5), and all had a positive prick-test and two had a

Table 2  
Summary of the immunological investigation

| Subject | IgE kU/l | RAST | Prick-test (mm)<br>1/100 1/1,000 |       | Reactions to challenge tests                                |          |
|---------|----------|------|----------------------------------|-------|-------------------------------------------------------------|----------|
|         |          |      |                                  |       | Lunelax powder 10 g/<br>crushed rusks 90 g                  | Placebo  |
| 1       | 40       | ++   | 10 × 6                           | 2 × 3 | nasal congestion,<br>rhinitis, sneezing,<br>ocular pruritus | negative |
| 2       | 30       | —    | 5 × 4                            | 2 × 2 | ocular pruritus<br>itching of the face                      | negative |
| 3       | 320      | +++  | 5 × 6                            | 5 × 5 | rhinitis, itching of<br>the hands and face<br>rash          | negative |
| 4       | 3        | +    | 3 × 2                            | 2 × 2 | negative                                                    | negative |
| 5       | 340      | —    | 3 × 3                            | 2 × 2 | ocular pruritus                                             | negative |
| 6       | 120      | —    | —                                | —     | negative                                                    | negative |
| 7       | 21       | —    | —                                | —     | negative                                                    | negative |
| 8       | 120      | —    | —                                | —     | negative                                                    | negative |

positive RAST. One subject (no. 4) with a weakly positive RAST and rather weak prick-test had no symptoms after challenge. No symptoms were recorded in any of the subjects with negative prick-tests.

None of the 20 subjects in the control group displayed positive prick-tests.

## DISCUSSION

A positive immediate prick-test reaction is a sensitive and reliable method for demonstrating a reagin-mediated sensitization if false-positive reactions, which are unusual with this method, can be excluded. With the solution used in this investigation the frequency of such reactions seems to be low, since none of the 20 subjects in the control group reacted.

An IgE-mediated sensitization can be confirmed by the finding of specific antibodies in serum by RAST; however, this test seems to be slightly less sensitive than the prick-test (1, 2). In this investigation three of the five subjects with a positive prick-test had a positive RAST. The two subjects with positive prick-tests but negative RAST showed symptoms of an immediate-type upon challenge. Thus these subjects seem to have become sensitized but the concentration of allergen-specific IgE in serum is too low to be detected by RAST. Five of the 20 subjects investigated could thus be considered sensitized.

The findings of this report fit the concept that atopics are more easily sensitized to inhaled allergens than normals and have higher levels of IgE in serum (7).

The mean IgE level in healthy Swedish subjects is 14 kU/l and mean  $\pm$  2 s.d. = 122 kU/l (7). Two of the eight subjects who reported symptoms in connection with ispaghula exposure (Table 2) had IgE titres exceeding this value and a further two had 120 kU/l. Only one of the 12 subjects without symptoms had IgE titre exceeding 120 kU/l (420 kU/l), and this subject had previous allergic disease.

Previous atopic disease or atopy in a near relative was also found in three of the five sensitized nurses. Patient A (see Case histories) also had previous atopic disease and a raised IgE level (180 kU/l).

The high frequency of sensitized subjects found in this investigation may partly be explained by the unusually high exposure in the selected group. But it also indicates that the powder which stems from the epidermis of the psyllium seed is a potent allergen. Patient A was subjected to ordinary exposure as a nurse but she had evident allergic disease. Strong symptoms after low-grade exposure and an allergy to Metamucil has earlier been reported in a patient who dispensed the medicine to his wife (4).

Further support for the assumption that ispaghula powder is a potent allergen is the very high frequency of sensitization reported in exposed workers (about 40%) from the medical firm (AB Tika) in Sweden, which produces Lunelax (9).

From the U.S.A., occupational reagin-mediated allergy has also been described in three workers who developed asthma and rhinitis while working in the pharmaceutical industry at a factory where psyllium seeds were ground (5).

The structure and dustiness of an allergen seem to have a strong influence on its allergenic properties. This is well-illustrated by the occurrence of allergy in the enzyme detergent industry, where granulation or encapsulation of the dusty enzyme markedly reduced the level of airborne dust and has led to a decrease in sensitization and allergic disease (6, 11). With this in mind we have advised the geriatric departments where the sensitized patients work to use the granulated form of bulk laxatives. Patient B has experienced less symptoms from this simple measure.

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