

Three cases of occupational asthma and rhinitis caused by garlic

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Introduction

Despite the fact that garlic is considered to be one of the most frequent causes of dermatitis of the fingertips in caterers [1], it has only rarely been associated with asthma or rhinitis. The first report of garlic-induced asthma dates back to 1940, when Henson described a foreman working in the sausage department of a wholesale meat packing plant. The patient's asthmatic symptoms disappeared after the garlic powder was substituted for 'kernels' [2]. Asthma, rhinitis and conjunctivitis have been found in children helping their parents with the harvesting of garlic in France [3]. It was not until 1981, however, that Falleroni *et al.* published the first case of garlic asthma with a demonstrated positive bronchial challenge [4]. The case described by Lybarger *et al.* developed marked adverse responses also after the ingestion of garlic [5]. The cases described by Henson, Falleroni *et al.* and Lybarger *et al.* all had atopic constitutions.

In this paper we describe two sausage makers from the same meat processing plant in Kuopio, Finland, both with bronchial asthma and allergic rhinitis caused by occupational exposure to garlic powder. The third patient worked as a teacher at the hotel and catering school in Kuopio, Finland, when she developed allergic rhinitis to garlic.

The working conditions

In the sausage making department, where the two sausage makers worked, chipped meat, water, dry potato flour, and powdered milk were poured mechanically into open flat blenders. After starting the blender the employer poured the premixed bags of spices into the blender. Besides garlic powder, ground white and black pepper, sweet pepper powder, caraway, cardamom, coriander, clove and ginger are commonly used to flavour the sausages.

Organic dust measurements in the sausage making department had been conducted twice at the beginning of the 1980s. In December 1981, the mean of 10 total dust

measurements taken at stationary collecting points was 38 mg/m^3 (range $8.2\text{--}84 \text{ mg/m}^3$) and the mean of seven samples taken from the workers' breathing zone was 19 mg/m^3 (range $9\text{--}34 \text{ mg/m}^3$). The Finnish limit value for grain dust is 10 mg/m^3 . The measurements were repeated in February 1982 after some improvements, including the attachment of hoods to the blenders, had been made. The mean of four stationary measurements taken had dropped to 1.5 mg/m^3 (range $0.1\text{--}2.8 \text{ mg/m}^3$) and the mean of the three samples taken from the breathing zone was 6.1 mg/m^3 (range $4.6\text{--}7.0 \text{ mg/m}^3$).

No dust measurements are available for the third case. The patient had worked as a cook since 1966 and had worked in the hotel and catering school from 1975. Here, her task as a leading cook was to teach the trainee cooks and kitchen workers in a teaching kitchen, where she also took part in normal restaurant work.

Description of the cases

Case 1

A male worker, aged 37, working in the sausage making department of a meat processing plant in Kuopio, Finland. He had worked in the same department since 1976, when he was 21 years of age. He had not shown any atopic manifestations nor did he report any such manifestations in close relatives. His first symptoms, which appeared in 1984, were sneezing, nasal obstruction, and clear rhinorrhea. At the same time he had recurrent sinusitis. During the following years the symptoms were more obviously connected with his work. In 1991 he reported dyspnea on two or three occasions during unusual exposure to garlic and spices, and he was referred to the chest clinic for suspected occupational asthma.

The skin-prick tests were performed by ALK (Allergologisk Laboratorium, Copenhagen) lancet for skin-prick testing. The skin reactions were recorded 15 min after the puncture. The largest diameter of the weal as well as the largest one perpendicular to it were measured. The size of the reaction was calculated by dividing the sum of these by 2. The test was positive if the size of the skin reaction was at least half of that produced by histamine. The test

Table 1. Results of the basic allergologic examinations of the three cases. The normal values are given in parentheses. The skin-prick test was measured by summing the largest diameter of the weal and the longest one perpendicular to it and dividing the sum by 2

Case	Blood eosinophils 10 ⁶ /l (40–440)	Total IgE U/l (22–115)	RAST for garlic U/l (0–0.34)	Garlic prick —mm	Histamine prick —mm
1	104	98	0.79	12.5	7
2	94	138	13.50	10	5
3	234	131	24.80	6	3

panel including common pollen and animal allergens, grains (ALK's allergens) and food stuffs was negative. For garlic and spices saline solutions were made for prick testing. The garlic prick-test was larger than the histamine control (Table 1). The patient was not tested for caraway and coriander, but other spices used in sausage making were included and they were all negative. Pulmonary function tests were normal and no bronchial hyperreactivity was found with histamine provocation. Ambulatory peak flow monitoring was carried out for 3 weeks but only after the patient had been removed from exposure to garlic to another job. This monitoring showed no major signs of obstruction. Chamber inhalation provocation with lactose produced no drop in the peak expiratory flow (PEF). However, when a provocation with garlic powder (50.0 g garlic with no additives) which mimicked the patient's actual working conditions, was undertaken, this produced, within 5 min, dyspnea with expiratory wheezing, rhinorrhea and conjunctivitis. The PEF dropped by 33% and a sympathomimetic inhalation did not improve this completely until 1 hr had elapsed. A late drop in PEF value was noticed 16 hr later. The patient reported no dyspnea but felt feverish after eating garlic. Later the worker was removed from the blenders to work with only an occasional exposure to garlic. He continued to use nasal corticosteroids but the need of inhaled sympathomimetics was less than once a month.

Case 2

A male worker, aged 38, had worked in the same department as case number 1 since 1974, when he was 20 years of age. He had shown no atopic symptoms nor were there any such symptoms among his close relatives. In his yearly health check-ups he had reported slight rhinorrhea since 1984.

In 1989 he developed dry, itching eczema in both

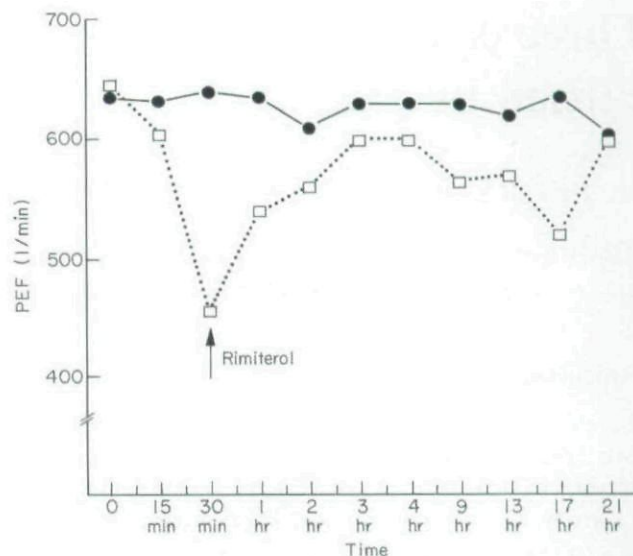


Fig. 1. Lactose (placebo) and garlic inhalation provocation in case 2. A 28% immediate drop in PEF is seen indicated by the arrow as well as a late reaction about 17 hr from the start of provocation. ---■---, Garlic. —●—, Lactose.

antebrachial and cubital regions. The symptoms resolved during the 5 days he was off work, but reappeared and worsened after he returned. He was referred to the University Hospital dermatologist who treated the dermatitis as an infection and after 2 months of treatment the dermatitis disappeared. However, the patient complained of dyspnea and irritation of the eyes during work. As the prick tests showed positive reactions to garlic and curry powder, the pulmonologist was consulted.

The same set of prick tests was carried out as in case number 1 and only garlic and curry powder, proved positive (Table 1). Inhalation provocation with lactose (placebo) produced no change in PEF, but provocation with garlic (50.0 g of pure garlic blended with the same amount of lactose) produced, after 18 min, dyspnea, coughing, rhinitis, and flushing of the face. PEF dropped by 28% and the dyspnea was only partially relieved by sympathomimetic inhalation. A late reaction was seen about 17 hr after the challenge test (Fig. 1). A work-related reduction in PEF was noted in a 3-week ambulatory PEF follow-up (Fig. 2). The patient had no symptoms as a result of eating garlic. The patient was moved to work in an environment with no garlic exposure and thereafter he was symptomless with no need of medication.

Case 3

The 46-year-old head cook had no previous history of allergies. Perennial nasal sneezing, rhinitis and stuffiness

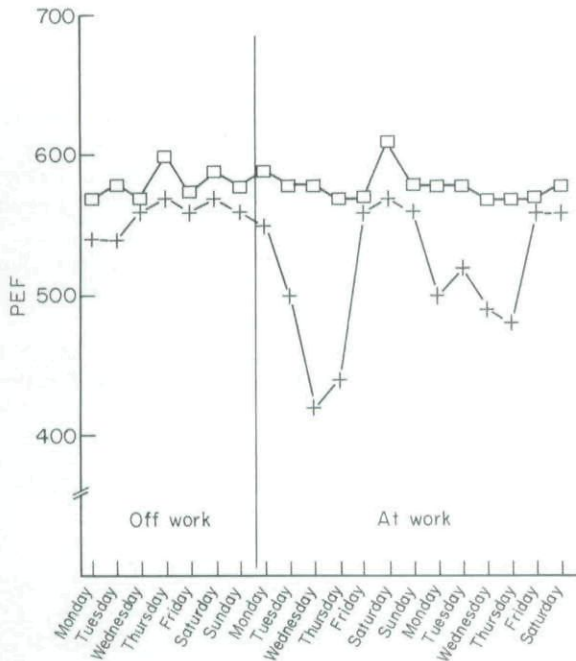


Fig. 2. A 2-week PEF follow-up of case 3. The first week shows the patient off work with no significant changes in PEF. At work the daily minimums tend to drop up to 30%. —■—. Daily maximum. —●—. Daily minimum.

associated with work began in 1976. On certain occasions she also had dyspnea and conjunctival irritation but no skin reactions. She noticed that the handling of flour, spices and especially garlic caused these symptoms and she tried to avoid such irritants, if possible. She was able to eat onions and garlic, and even liked them. On maternity leave in 1979 and between 1982 and 1986 she had no symptoms except when baking at home.

In 1989 the patient came to the Department of Otorhinolaryngology of Kuopio University Hospital for investigations because occupational rhinitis was suspected. The nasal mucosa was very swollen and the voice was nasal. Paranasal sinuses were normally aerated in a X-ray. A nasal smear gave normal cytological results. Serum total IgE was slightly over normal range (131 U/l) and the RAST (Pharmacia, Lund) for garlic was elevated (Table 1). In skin-prick testing there was a positive reaction to garlic, to onions and to wheat flour but there was no reaction to spices, pollens, animals or vegetables. The spirometry was normal.

When handling wheat flour in the challenge chamber for 10 min the patient developed profound rhinitis and nasal obstruction for 5 min. Nasal peak expiratory flow (nasal PEF) values were reduced by over 15%. A placebo challenge a day earlier with lactose powder produced no

subjective or objective reactions. Thus, occupational rhinitis caused by wheat flour was diagnosed.

Some weeks later the patient was challenged to garlic powder in the same way. After 2 min pouring the powder from one vessel to another the patient began to feel ill and she vomited. Her nose was running with mucous clear secretion and was quite obstructed. The nasal PEF values were reduced by about 50% compared with the values before the challenge. The patient also had dyspnea but no expiratory wheezing was heard on auscultation and her face became flushed and her facial skin began to itch. PEF measurements or other lung functions were not made. She was given antihistamine (cetirizine) and sympathomimete (salbutamol). The reaction subsided in about 1 hr. Later, she continued in kitchen work, but in a modern, well ventilated kitchen avoiding garlic exposure as much as she could. Her need of medication is only occasional.

Discussion

So far we have found three published cases of occupational asthma or rhinitis caused by garlic in adults. Unlike those, our patients did not have anamnestic atopic constitutions. In the two cases of asthma it took a relatively long time for asthma to develop after the first symptoms of rhinitis occurred. The delay from the onset of symptoms to the diagnosis of garlic allergy in all our cases was rather long. In case 3, it was more than 10 years and in the others it was about 5 years. This delay could be due to several reasons. One of these reasons may be that, specialists are not consulted readily in the case of an unusual allergy and, secondly, that the patients might adapt themselves to the gradual onset of symptoms. With the exception of Case 3, the allergies of the patients were limited to garlic, and without garlic contact they remained symptomless. Case 3 had also an occupational flour allergy.

The patients with asthma showed marked reductions in PEF values and also other systemic symptoms in the challenge tests. They also had late reactions. Case 3 also had dyspnea, facial flushing, and itching in the challenge test. It would be advisable to start the challenge tests more carefully with small amounts of garlic powder.

The two cases of garlic asthma and rhinitis in the meat processing plant demonstrate the difficulties in establishing safe limits for potential allergens. The two workers developed allergic symptoms even when working conditions improved. However, at the same time, the changing trends in food consumption led to an increase in the amount of garlic used in sausages and therefore exposure to garlic in particular may have increased even if total

organic dust exposure decreased. Up to 1.0 g of garlic powder is now used for each kg of sausage.

As the use of garlic increases in Finland, it is probable that more cases of garlic rhinitis and asthma will be found. Considering the results found in our three cases, it seems that the development of garlic asthma requires a relatively long period of time and that it is preceded by rhinitis. It may be advisable to examine all cases of rhinitis thoroughly for garlic allergy if there has been any contact with garlic at the work place. As the prevalence and incidence of garlic allergy in occupations exposed to garlic as well as in populations in general is not known, it should be studied.

References

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