Exposure to psyllium: an emerging risk for food industry workers

Gluten-free and vegan products may include psyllium powder as an additive. While it is known to trigger allergic reactions in pharmaceutical workers and healthcare professionals, little is known about such reactions in food industry workers. However, a clinical case was recently described in the literature, and a French case was identified by the National Network for Monitoring and Prevention of Occupational Diseases (RNV3P).

Gluten-free food has become very popular in France in recent years, as shown by the steady growth rate of the French market for gluten-free products, which increased by around 20% between 2016 and 2020 [1].

Gluten is the insoluble protein fraction of cereal grains such as wheat, rye, oats, spelt or barley. This protein mixture gives the flour viscoelastic properties which are responsible for the elasticity of the kneaded dough and the chewability of baked cereal products. However, gluten consumption can have harmful effects on some people, especially those with allergies or coeliac disease[1], who are advised to avoid gluten completely in their diet. Some people are also said to be "gluten hypersensitive", a disorder with a poorly understood pathophysiology that manifests as non-specific digestive or non-digestive symptoms after ingesting gluten. These symptoms improve when gluten is excluded from the diet and reappear with its reintroduction.

At the same time, more and more consumers are embracing a vegan diet. This involves eliminating all foods of animal origin including eggs, dairy products and honey.

In order to meet the demand for gluten-free and vegan products, the food industry has therefore adapted by introducing ingredients such as psyllium powder into recipes.

The hydrocolloid properties of this powder give elasticity and viscosity to gluten-free doughs. In vegan products, psyllium is used as an egg substitute [2]. This introduction of new ingredients then leads to changes in the occupational exposure of workers in the food industry, with potential new health risk situations.

Psyllium plants have long been used for their seeds high in fibre and mucilage

The term psyllium is used to refer to several different species of plants belonging to the Plantaginaceae botanical family: *Plantago ovata* (*P. ovata*) known as blond psyllium or ispaghul, and *Plantago afra*, or black psyllium.

The seed coat of these psyllium plants is very high in fibre and, in particular, in mucilage[2] (especially blond psyllium). This explains why psyllium has long been used as a laxative.

Allergic symptoms from occupational exposure to psyllium

In the past, numerous cases of occupational allergy to psyllium have been described in the scientific literature: the individuals concerned were employees in the pharmaceutical industry or healthcare professionals who had handled *P. ovata* seed powder during the manufacture or preparation of laxatives.

The death of a nurse from a severe asthma attack after handling a laxative made from *P. ovata* seeds has even been described, due to an anaphylactic reaction[3] caused by psyllium inhalation [3].

In 2021, the first case of occupational allergy to psyllium was reported in a female baker who had been diluting psyllium powder in a liquid before incorporating it into a bread dough made of a gluten-free flour mixture [2].

1. A chronic, autoimmune intestinal disease related to the ingestion of gluten, occurring in genetically predisposed individuals.
2. Plant substance capable of absorbing a large volume of water, taking on a viscous consistency.
3. Sudden allergic reaction, potentially serious or even fatal.

After one year of exposure, the patient began suffering from rhino-conjunctivitis, which was triggered at work, as well as coughing and dyspnoea. After two years of exposure, she developed contact urticaria on her wrists. Prick tests[4] revealed sensitisation to wheat, rye and buckwheat flours, but also to psyllium. A nasal provocation test[5] confirmed the diagnosis of allergic rhinitis to psyllium.

Following this publication, ANSES and its expert group on "Emerging issues in Occupational Health" searched for similar cases in the database of the National Network for Monitoring and Prevention of Occupational Diseases (RNV3P), which records summaries of consultations carried out in the 28 occupational and/or environmental disease centres (CCPPEs) in France. A case of allergic rhinitis in a production worker in the industrial food manufacturing sector was identified.

A French case in the food industry identified by the RNV3P

This patient, who had been working in an industrial cake manufacturing company since 2015, consulted a CCPPE in 2019 for clinical manifestations possibly related to his work. He was required to manually load the various recipe ingredients into the production tank, mainly in powder form. He was thus constantly and significantly subject to respiratory exposure to flour and other components of the recipes. This was compounded by exposure to resuspended dust when the workstation was cleaned, once or twice a week.

According to the patient, symptoms of rhinitis with nasal obstruction, severe rhinorrhoea, sneezing and conjunctivitis had appeared as early as 2017.

These symptoms were work-related, i.e. they appeared after one hour of work, regressed in the evening after stopping work and disappeared completely during the holidays.Then respiratory symptoms such as nocturnal wheezing and dyspnoea on exertion appeared. Respiratory function tests, carried out three weeks after stopping work, were within normal limits, with no non-specific bronchial hyperresponsiveness from a methacholine test[6].

In order to check whether certain substances used by the patient at his workplace could be the cause of the clinical condition, prick tests were carried out with the different ingredients handled. The results showed sensitisation to wheat and rye flour, but also to psyllium. The CCPPE doctor diagnosed occupational allergic rhinitis with sensitisation to various allergens, particularly psyllium. This diagnosis enabled the patient to apply for its recognition as an occupational disease under Table 66 of the General Regime, relating to occupational rhinitis and asthma.

An emerging occupational disease in a new occupational context

Faced with the possible increase in occupational exposure to psyllium in the food industry and the consequent increase in the risk of sensitisation to psyllium, an information message was sent to all CCPPEs, inviting doctors to watch out for exposure and sensitisation to this allergen in patients working in the manufacture of food products.

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References

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6. The methacholine challenge test is used to diagnose bronchial hyperresponsiveness, a characteristic of asthma.