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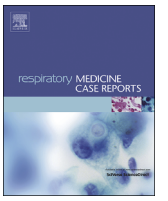

Case Report

Psyllium husk (Metamucil®) induced perennial asthma: A case report

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ABSTRACT

Metamucil®, a soluble fiber supplement for constipation, triggered new onset asthma symptoms in a 44-year-old sensitised nurse after a single inhaled exposure. After the initial event, she had no further exposures. She continued to face challenges with exacerbations, poor asthma control, and chronic cough. Despite 30 years of clinic follow-up, her asthma remained difficult to manage, requiring chronic prednisone. While tapering off corticosteroids, she developed polymyalgia rheumatica. This case underscores that psyllium in Metamucil® can cause reactions ranging from mild to severe, even with a single inhaled exposure, emphasising the need for caution in those without a history of asthma.

1. Introduction

Occupational Asthma (OA) is a form of work-related asthma, typically beginning during adulthood. It is characterised by variable airflow obstruction, airway hyperresponsiveness, and airway inflammation attributable to a particular exposure in the workplace and not due to stimuli encountered outside the workplace [1]. The stimuli can be either immunologic or non-immunologic. OA due to an immunologic stimulus typically has a latency period between the exposure and symptom onset, while nonimmunologic does not. Immunologic stimuli are further subcategorised as high (HMW) or low molecular weight compounds [1]. Immunologic stimuli can cause reactions through different routes such as inhalation, ingestion, or contact, leading to asthma, anaphylaxis, or rashes, respectively. In industrialised countries, occupational factors have been implicated in up to 15 % of all cases of adult-onset asthma [2,3]. This number is expected to rise, given evolving industrial practices. Among causative agents of occupational asthma, food-derived and inhalant components are increasingly being reported, accounting for up to 25 % of cases of OA [2,3]. It is essential to establish a diagnosis to prevent worsening of symptoms, as well as to prevent other workers from being exposed, by providing early treatment and counseling.

Metamucil® is a brand-name HMW soluble fibre supplement containing psyllium husk derived from the seeds of the *Plantago ovata* plant [4]. Psyllium has a hydrocolloid property, which has made it popular as a bulk laxative for the treatment and prevention of constipation. It has also shown efficacy as a lipid-lowering supplement when combined with a statin [5]. Because of the rising incidence of coeliac disease and the trend of consuming gluten-free and vegan food, psyllium has emerged as a popular baking ingredient, often replacing gluten or eggs [6]. The increased use of psyllium husk over the last century has led to a few emerging reports of adverse events following exposure, and is now being referred to an as a food and inhaled allergen. Unfortunately, there is limited understanding of the spectrum of symptoms, management, and prognosis of individuals who develop hypersensitivity to Metamucil®. We

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present a case of life-long difficult to control asthma induced by a single large inhaled high Metamucil® exposure in an otherwise healthy female nurse.

2. Case presentation

A 44-year-old Caucasian female nurse experienced her first episode of asthma after a single inhaled exposure to Metamucil® at a long-term care home. The patient described this as a single large exposure after she mixed a large bag of Metamucil® powder into a large volume of water. Exposure to aerosolized powder led to a cough, chest tightness, and dyspnoea. She borrowed a short-acting β_2 agonist (SABA) puffer from her child and two-weeks later, presented to a family doctor with wheezing and tachycardia, the latter likely due to SABA overuse. Beclomethasone, theophylline, and fenoterol were prescribed but her symptoms did not completely resolve. The patient was subsequently seen at our respiratory clinic 4 weeks after symptom onset for further workup and treatment. She was a lifelong non-smoker. She did not have any pets, bird, or feathered material in her home. She did not have a travel history prior to presentation. The patient had a sister with allergic rhinitis and three children with allergic asthma. Her mother had passed away from a carcinoma of the lung and father had a meningioma with pulmonary thromboembolic disease following resection. The patient's medical history was unremarkable. She previously had tubal ligation, tonsillectomy, and appendectomy for a ruptured appendix. The patient experienced perennial nasal symptoms in the form of sneezing and nasal stuffiness which worsened one month prior to presentation. She was sensitive to certain fresh fruits which caused hives. She was able to use aspirin in the past without experiencing respiratory symptoms.

At our clinic the patient was normotensive and tachycardic. Examination of the respiratory system revealed a persistent and restricted asthmatic cough. She had some hyperresonance with low diaphragms. There were medium to coarse expiratory wheezes heard throughout the chest. The rest of her physical exam was unremarkable. Pulmonary function tests (PFT's) showed reversible airflow obstruction with a Forced Expiratory Volume in 1 s (FEV_1) of 1.8 (65 % predicted) and Forced Vital Capacity (FVC) of 2.9 (85 % predicted) which improved to 2.0 and 3.0 L post-bronchodilator, respectively. Chest radiograph demonstrated hyperinflation. Skin prick testing was negative to 25 common allergens but was reactive (wheal size 4 × 5 mm) to a homemade Metamucil® mixture. The diagnosis was in keeping with asthma induced by atopic hypersensitivity to Metamucil®. She was treated with prednisone 20 mg for 2 weeks, twice daily beclomethasone, and fenoterol as needed.

The patient has been followed thereafter for more than three decades, facing challenges with tapering off systemic corticosteroids. She was seen regularly from 1982 to 2015, starting monthly, then every six months, and annually toward the end of her care as her condition stabilized. Over these 33 years, she also visited the clinic during severe exacerbations. She has moderate to severe asthma with fluctuating levels of control, from fair to poor. Despite no further exposures after the first event, her asthma caused several severe coughing episodes leading to fractured ribs. The patient remained on worker's compensation, and it was not deemed appropriate to return to work as she could not avoid exposure to Metamucil®. She demonstrated a type-2 high endotype with peripheral eosinophils as high as 580 cells/uL and total serum IgE of 189 KU/L despite a maintenance prednisone daily dose of 15 mg. After thirty years, the patients PFT's continued to demonstrate mild fixed obstruction with an FEV_1/FVC of 0.64, an FEV_1 and FVC of 1.71 (97 %) and 2.67 L (104 %) respectively, and no significant bronchodilator response. Forced expiratory flow (FEF 25–75 %) post-bronchodilation was 50 % of reference. The chest radiograph shows ongoing hyperinflation. During her corticosteroid taper, she also experienced joint pain due to corticosteroid withdrawal and was subsequently diagnosed with polymyalgia rheumatica (PMR). She eventually achieved satisfactory control with budesonide/formoterol used as both maintenance and reliever. She did not meet the criteria for Omalizumab, the only biologic available at the time, Her prednisone 5 mg daily was continued for treatment of her PMR.

3. Discussion

Psyllium is a versatile soluble fibre utilized in several compounds such as laxatives and baking materials. Though it has broad utility, it is imperative to recognize the allergenic property of psyllium. There have been case-reports demonstrating the spectrum of hypersensitivity reactions among healthcare professionals and workers in pharmaceutical plants induced by exposure to psyllium [7,8]. Reactions range from a skin rash to more severe manifestations, including anaphylaxis, acute respiratory distress requiring intubation, and death [9]. These occurrences have predominantly been in individuals with long-term exposure or a history of asthma. Information about psyllium-induced asthma's long-term clinical manifestations, treatment options, complications, and prognosis are sparse. Our patient tested negatively on her allergy test for the most common allergens. It seemed likely it was Metamucil induced given that when she tried to return to work, she had another exacerbation. A substantial exposure to an allergen can lead to the development of persistent asthma in some individuals. This initial sensitization can cause the immune system to overreact to subsequent exposures, leading to chronic asthma symptoms. This case report of a patient followed for 30 years adds to this limited body of knowledge, uniquely illustrating that a single large, inhaled Metamucil® exposure can lead to life-long disabling and poorly controlled occupational asthma in a patient without a history of asthma.

Our patient presented after her exposure with classic asthma symptoms, eosinophilia, and elevated IgE. There are several cases highlighting the potential for IgE-mediated hypersensitivity reactions to psyllium, particularly in occupational settings. A vegan baker developed allergic rhinitis after a year of exposure [6]. Workers in pharmaceutical handling and packaging facilities experienced symptoms such as rhinitis, conjunctivitis, or asthma, especially those with a history of atopy [10,11].

Other studies elucidating the mechanism of airway hypersensitivity have shown workers exposed to psyllium experienced asthma symptoms that improved upon allergen removal but recurred upon re-exposure. The patients with persistent specific bronchial responsiveness showed higher total IgE levels, suggesting an ongoing immune response driving respiratory symptoms [12,13].

Metamucil® is commonly used in hospitals for patients who require bowel care, placing frontline workers such as nurses at risk of prolonged exposure. In one case, a nurse with 15 years of exposure developed anaphylaxis, which resolved with bronchodilator, intravenous corticosteroids, and anti-histamines [14]. Further highlighting the risk, there are additional reports of nurses handling psyllium and experiencing adverse reactions, with one nurse requiring intubation due to severe bronchospasm during an inhaled challenge [6]. Cutaneous manifestations and anaphylaxis were reported in two other nurses [15]. A larger study across chronic care hospitals found nurses with a history suggestive of occupational asthma and positive skin tests to psyllium exhibited significant airway hyper-responsiveness and increased IgE levels [15,16].

Our case and those previously reported highlight importance of high cleanliness standards in the workplace. Employees showing signs of sensitivity to psyllium should not work in areas where it is present. Information provided in package inserts and manufacturers' materials should highlight the potential for allergic reactions. They should also warn against practices that could disperse psyllium into the air. Those who handle or use psyllium-containing laxatives should opt for granulated forms of the product instead of powders, as less aerosolization occurs [16,17].

4. Conclusion

To our knowledge, this is the first case described of a patient sensitised by prior workplace exposures experiencing life-long symptoms, with difficulties achieving reasonable asthma control after a one-time large exposure to psyllium through inhalation. Though the literature describing the adverse effects of psyllium exposure has slowly increased over the last 60 years, there remains limited knowledge among workplaces in which employees have significant exposure. Increased awareness among workplaces and individuals regarding the potential for allergic reactions to psyllium is crucial for preventing adverse health effects.

5. Learning points

5.1. Learning point 1: psyllium and its allergenic potential in an occupational setting

- Psyllium is a high molecular weight soluble fiber used in baking products and as a bulk laxative in products like Metamucil®.
- Despite its benefits, psyllium can be a potent allergen, causing reactions from mild skin rashes to severe respiratory distress and even anaphylaxis, especially among healthcare professionals and pharmaceutical packers.

5.2. Learning point 2: life-long asthma symptoms can occur after a single exposure to psyllium

- The report chronicles a 44-year-old nurse who developed life-long, difficult-to-control asthma after a single large, inhaled exposure to Metamucil®.
- Despite treatment and avoidance of further exposure, she experienced persistent symptoms and complications over three decades, highlighting the severe and long-term impact of psyllium-induced OA.

5.3. Learning point 3: importance of workplace safety, awareness, and risk mitigation strategies

- The case underscores the need for high cleanliness standards and proper handling practices in workplaces to prevent psyllium exposure.
- Employees with sensitivities should avoid areas with psyllium, and manufacturers should clearly indicate the potential for allergic reactions.
- Using granulated forms instead of powders can reduce the risk of aerosolization and inhalation.

CRediT authorship contribution statement

A.S. Marwaha: Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **D. Cockcroft:** Writing – review & editing, Supervision, Formal analysis, Data curation, Conceptualization. **B. Philipenko:** Writing – review & editing, Supervision, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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