CASE REPORT

Algae-induced occupational asthma in a thalassotherapist

Louis-Philippe Boulet

Background
Algae powders have been increasingly used in therapeutic preparations. Their potential as inducers of occupational asthma (OA), however, remains to be demonstrated.

Methods
A 33-year-old woman developed asthma following exposure to algae powder used for thalassotherapy. She had positive patch tests to nickel and cobalt in an evaluation for intermittent skin rash. At work, she had a normal forced expiratory flow in 1 s (FEV₁) but moderate airway hyperresponsiveness. Bronchial provocation tests (BPT) were obtained.

Results
On BPT, an isolated early response was observed after a 1-min inhalation of dry algae powder, with a 50% fall in FEV₁ after exposure; the control BPT with lactose powder was negative.

Conclusions
We report a case of algae-powder-induced OA. Such responses could be due to a sensitization to algae proteins or metal contaminants bioabsorbed by the vegetal particles.

Key words
Algae; occupational asthma; thalassotherapy.

Introduction

Occupational asthma (OA) can develop following inhalation of various substances including vegetal particles from different sources [1,2]. Despite an increasing number of workers being exposed to algae powder in thalassotherapy centres, little is known about the potential of algae particles as inducers of asthma. Ng et al. [3] have previously recorded the development of OA in a pharmacist following exposure to Chlorella, a unicellular algae preparation. We have, however, little information on the prevalence of this problem and on the mechanisms by which these substances can induce asthma. We describe the case of a worker who developed OA following exposure to algae powder.

Case history

A 33-year-old female thalassotherapist was referred for assessment of possible OA. Thalassotherapy is the use of seawater or seaweed for beautification and therapeutic purposes. Her work included massages, performing marine algae wraps, therapeutic baths and various other body-care techniques, usually using essential oils, gels of oligoelements and various substances that may contain nickel, cobalt or vitamin B12. After working at the centre for 2 years, she developed a productive cough with occasional chest tightness, wheezing, and shortness of breath, itching of the eyes and nasal obstruction with sneezing. The symptoms mostly occurred at night after her work shift. When manipulating the algae powder, she experienced increasing dyspnoea and had sometimes to use 10–12 inhalations of bronchodilator per day to control her symptoms. None of her sixteen co-workers reported ocular, nasal or respiratory problems. Her respiratory symptoms disappeared almost completely out of work. She had previously seen a dermatologist for recurrent skin rash and a patch test had shown strong positive responses to nickel and cobalt. She had smoked about 10 cigarettes daily from the age of 17 until about 1 year. She had no animals at home. On physical examination, wheezing on chest auscultation and 'granulomatous pharyngitis' were previously reported. Skin-prick tests with a battery of common allergens showed positive reactions to animals, tree and grass pollens and house-dust mite. Chest X-ray and routine blood tests were normal. Pulmonary function tests revealed air trapping and mild airflow limitation. The forced expiratory flow in 1 s (FEV₁) was 2.21 l (80% of predicted value) with a FEV₁/forced vital capacity (FVC) ratio of 65, and forced expiratory flow was between 25% and 75% of FVC (FEF₂₅₋₇₅) of 43% of the predicted value. Total lung capacity and lung diffusion capacity were normal.

Hôpital Laval, Centre de Pneumologie, Sainte-Foy, Québec, Canada.

Correspondence to: Louis-Philippe Boulet, Hôpital Laval, 2725, chemin Sainte-Foy, Sainte-Foy, Québec G1V 4G5, Canada. Tel: +1 418 656 4747; fax: +1 418 656 4762; e-mail: lpboulet@med.ulaval.ca

© The Author 2006. Published by Oxford University Press on behalf of the Society of Occupational Medicine. All rights reserved. For Permissions, please email: journals.permissions@oxfordjournals.org

Occupational Medicine 2006;56:282–283
doi:10.1093/occmed/kql007
On methacholine inhalation, the provocative concentration of methacholine inducing a 20% fall in FEV1 (PC20) was 0.79 mg/ml, demonstrating the presence of moderate airway hyperresponsiveness.

A specific bronchoprovocation test was done with the algae powder she used in her current work after withholding inhaled fluticasone for 48 h (Figure 1). The powder was gently shaken in a plastic bag while the patient breathed over the bag. An early-type asthmatic response was then observed, with a 48% fall in FEV1 30 min after inhalation of the algae powder for slightly less than 1 min. Control bronchoprovocation with lactose powder did not produce a significant fall in FEV1. There was no evidence of late asthmatic response following the algae powder inhalation. The day after the exposure to the algae, the PC20 methacholine was 0.3 mg/ml. Hourly peak flow measurements during the evening following the inhalation of the algae powder showed no significant fall.

Discussion

Algae do not contribute significantly to the natural load of allergen-bearing particles in the air. However, as these vegetal substances are increasingly used in various therapeutic preparations, there is a potential for workers to become sensitized to these products. Their potential as OA inducers remain to be documented [4].

We report a case of OA induced by exposure to algae powder in an atopic subject without previous history of asthma. Allergic-type sensitivity to algae and lichens has been described [5]. The worker described here had previous evidence of dermatitis coinciding with exposure to these substances, although it was difficult to determine whether this was an effect of the algae preparation or of the metals that could be found in the preparation. Previous studies on marine macroalgae showed that these vegetals are biosorbents for minerals such as cadmium and nickel in the water [6]. In experimental studies, Ofer et al. showed that the brown marine algae Sargassum vulgaris and Padina pavonia could be used to develop an efficient biosorbent for heavy metal removal from aqueous solutions [7]. It is possible that the worker we describe was sensitized to the vegetal components of the algae, but also to the minerals absorbed by it.

In regard to possible limitations of the test, a lactose powder challenge was used as a control to detect spontaneous variations in expiratory flows and the influence of a non-specific irritant inhalant as it was difficult to blind the algae powder test. However, the magnitude of the bronchoconstrictive response, the pattern of recovery of expiratory flows and changes in airway responsiveness support a specific asthmatic response to the algae powder. Specific IgE and IgG levels were not measured, the presence of IgE may be a reflection of exposure only rather than being diagnostically helpful for OA.

Finally, in regard to the possibility of an induced alveolitis, the acuteness of the response, the absence of symptoms of alveolitis (no flu-like symptoms or increased body temperature), and the pattern and time-course of changes in pulmonary function are not in keeping with this possibility.

In conclusion, we report OA following inhalation of algae powder in the context of the subject’s work in a thalassotherapy centre. Awareness of the potential for this type of health problem in these workers should be raised so that they can be quickly withdrawn from such sensitizing exposures, thus preventing further deterioration of their respiratory function.

References