

CASE REPORT

Allergic bronchopulmonary aspergillosis in garden waste (compost) collectors—occupational implications

C. J. M. Poole and M. Wong

Department of Occupational Health, Dudley & Walsall NHS Trust, Health Centre, Dudley DY1 1RN, UK

Correspondence to: C. J. M. Poole, Department of Occupational Health, Northern General Hospital, Sheffield S5 7AU, UK.

Tel: +44 (0)114 2714161; fax: +44 (0)114 2714844; e-mail: charles.poole@btinternet.com

Abstract

The separation of rotting garden material from general domestic waste and its collection for processing in industrial composting sites is a relatively new industry in the UK. Two cases of allergic bronchopulmonary aspergillosis and the results of health surveillance are described in a team of 28 garden waste (compost) collectors. A few cases of extrinsic allergic alveolitis due to *Aspergillus fumigatus* have previously been reported in compost workers. In the absence of any guidance from research and to prevent similar cases of a potentially serious illness, we advise that new starters to the job of collecting or processing compost are screened for asthma and aspergillus sensitivity, cystic fibrosis, bronchiectasis and immunodeficiency if their exposure to high levels of *Aspergillus sp* cannot be controlled. Annual health surveillance for these workers is also recommended.

Key words

Allergic bronchopulmonary aspergillosis; aspergillus; compost; garden waste.

Introduction

The separation of garden waste from domestic waste, its collection and processing in industrial composting sites, so as to reduce biodegradable waste going to landfill, is a relatively new industry in the UK. The process of composting organic matter encourages the production of bacteria, fungi, spores and endotoxins, which may be released to air in bioaerosols. Levels of bacteria and fungi up to 10^6 colony forming units/m³ in ambient air have been reported in relation to composting, and there are no safe levels of exposure [1,2]. The exposure of workers to such aerosols will depend on the composition of the compost, weather conditions and the controls employed during collection and processing.

To date, there have been very few reports of illness in these workers. In a cross sectional study of 218 compost workers in Germany [3], there was increased job turnover, eye and upper airway irritation, chronic bronchitis, two cases of extrinsic allergic alveolitis (EAA) due to *Aspergillus fumigatus* and decreased lung function compared with controls. There is one case report of allergic bronchopulmonary aspergillosis (ABPA), EAA and asthma in a garbage collector in

Germany [4]; one report of ABPA in a soy sauce maker in Japan who used *Aspergillus oryzae* in the fermenting process [5] and one suspected case of ABPA in a vegetable compost worker in Belgium [6]. Two cases of EAA after spreading damp bark chippings, one of which was fatal, have been reported from Denmark [7].

ABPA is a complex allergic response to the fungus *Aspergillus sp* that is most commonly seen in patients with asthma or cystic fibrosis who are genetically predisposed. It involves the activation of mast cells, B-cells, C4+ and Th2 cells, with the release of cytokines, immunoglobulins and proteases [8]. It is an uncommon illness, but it can be severe and chronically relapsing. Fungi other than *Aspergillus* have also been implicated.

It was first described in 1952 by Hinson *et al.*, but the diagnostic criteria have subsequently been refined [9,10]. They include coughing and wheezing, evidence of both type I and type III hypersensitivity reactions to *Aspergillus* antigens, raised total immunoglobulin E (IgE) levels, eosinophilia, pulmonary infiltrates and mucus impaction or bronchiectasis on chest radiography. *Aspergillus sp* may be grown from sputum or bronchial washings, and the fungus may manifest as rubbery bronchial casts or plugs of hyphae.

Early detection to prevent serious lung damage and treatment with oral corticosteroids and itraconazole as an adjunct has been recommended.

Case 1

A 35-year-old collector of garden waste, who had been doing the job for 3 years, was seen in an occupational health clinic. He complained of coughing with expectoration of rubbery brown casts and haemoptysis. He had also had night sweats and lost two stone in weight. He had a past history of unexplained erythema nodosum, but no atopy.

A chest X-ray showed bilateral hilar adenopathy and consolidation in the right mid-zone. His sputum was negative for acid fast bacilli but grew *A. fumigatus*. He had eosinophilia ($1.01 \times 10^9/l$), a raised total IgE (456 kuA/l), grade 4 positive specific IgE to *A. fumigatus*, positive specific immunoglobulin G (IgG) to aspergillus (104 mgA/l, Immunocap) and negative serum angiotensin-converting enzyme. Bronchial washings were also positive for *A. fumigatus*. A high resolution computed tomography (HRCT) scan of the chest showed bronchiectasis proximally in the lingula and throughout the right middle lobe. ABPA was diagnosed with suspected underlying sarcoidosis. He was treated with oral corticosteroids. On recovery, spirometry and gas transfer factor were normal. He was advised not to work with compost and was lost to follow-up.

Case 2

A 43-year-old collector of garden waste, who had been doing the job for 2 years, was seen in an occupational health clinic from the same employer the year before case 1. He complained of coughing with green plugs, dyspnoea and wheezing. He had a long history of symptomatic allergic rhinitis and asthma.

A chest X-ray showed atelectasis in the right mid-zone, and his sputum grew *A. fumigatus*. He had eosinophilia ($1.5 \times 10^9/l$), a raised total IgE (692 kuA/l), grade 3 positive specific IgE to *A. fumigatus* and positive specific IgG to *A. fumigatus* (by enzyme-linked immunosorbent assay). HRCT of the chest was not performed. Spirometry was normal. ABPA was diagnosed. He was treated with oral corticosteroids and itraconazole. He was advised not to work with compost. He changed his job and was well when last seen a year later.

In the light of the two previous cases, the 26 other garden waste collectors were given a questionnaire to complete enquiring about chest symptoms and previous chest disease. The eight with positive responses were examined and tested for serum IgE and IgG and skin prick tested (SPT) for *Aspergillus* sensitivity. One was asthmatic with positive specific IgE and positive SPT to *A. fumigatus*. He was advised not to work with compost. Another was found to have bird fancier's lung.

Discussion

A cluster of two cases of ABPA in a small workforce of 28 operatives collecting garden (compost) waste is notable and provides further evidence that uncontrolled exposure to *A. fumigatus* may cause serious lung disease. These cases were seen in two different hospitals, and the link to their jobs was made by their employer's occupational physician.

Until the results of large epidemiological studies of garden waste collectors and industrial compost workers are known, the few case reports of ABPA and EAA due to *Aspergillus* sp would indicate that workers with asthma who are sensitized to *A. fumigatus* or who have cystic fibrosis, bronchiectasis or are immunosuppressed should not work with garden waste or compost, unless their exposure to airborne fungi can be controlled. Whether asthmatics who are SPT positive or specific IgE positive to *A. fumigatus* will go on to develop ABPA is unknown, but they should be made aware of the theoretical risk.

Annual health surveillance by way of a respiratory questionnaire and skin prick testing is also recommended for these workers. Other cases of ABPA or EAA in garden waste and compost workers should be sought and reported, until such time that the results of a national study of UK compost workers are known.

Key points

- Workers involved with the collection or processing of garden waste (compost) may be exposed to high concentrations of the fungus *Aspergillus fumigatus*.
- Two cases of allergic bronchopulmonary aspergillosis are reported in a team of compost collectors.
- Workers who collect or process compost should undergo pre-employment screening and regular health surveillance.

Conflicts of interest

None declared.

References

1. Swan JRM, Kelsey A, Crook B, Gilbert EJ. *Occupational and Environmental Exposure to Bioaerosols from Composts and Potential Health Effects – A Critical Review of Published Data*. HSE Research Report 130, 2003. <http://www.hse.gov.uk/research/rpdr/rr130.pdf>
2. Stagg S, Bowry A, Kelsey A, Crook B. *Bioaerosol Emissions From Waste Composting and the Potential for Workers' Exposure*. HSE Research Report 786, 2010. <http://www.hse.gov.uk/research/rpdr/rr786.pdf>
3. B nger J, Schappler-Scheele B, Hilgers R, Hallier E. A 5-year follow-up study on respiratory disorders and lung

- function in workers exposed to organic dust from composting plants. *Int Arch Occup Environ Health* 2007;**80**:306–312.
4. Allmers H, Huber H, Baur X. Two year follow-up of a garbage collector with allergic bronchopulmonary aspergillosis (ABPA). *Am J Ind Med* 2000;**37**:438–442.
 5. Kurosawa M, Kobayashi S, Yanagihara Y, Shida T. A case of occupational allergic bronchopulmonary aspergillosis unique to Japan. *Br J Clin Pract* 1990;**44**:482–489.
 6. Vincken W, Roels P. Hypersensitivity pneumonitis due to *Aspergillus fumigatus* in compost. *Thorax* 1984;**39**:74–75.
 7. Arendrup MC, O'Driscoll BR, Petersen E, Denning DW. Acute pulmonary aspergillosis in immunocompetent subjects after exposure to bark chippings. *Scand J Infect Dis* 2006;**38**:945–949.
 8. McCormick A, Loeffler J, Ebel F. *Aspergillus fumigatus*: contours of an opportunistic human pathogen. *Cell Microbiol* 2010;**12**:1535–1543.
 9. Rosenberg M, Patterson R, Mintzer R, Cooper BJ, Roberts M, Harris KE. Clinical and immunologic criteria for the diagnosis of allergic bronchopulmonary aspergillosis. *Ann Intern Med* 1977;**86**:405–414.
 10. Vlahakis NE, Aksamit TR. Diagnosis and treatment of allergic bronchopulmonary aspergillosis. *Mayo Clin Proc* 2001;**76**:930–938.