CASE REPORT

Holy Saturday asthma

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SUMMARY

A 61-year-old man complained of cough and dyspnoea after exposure to colophony-containing solder fumes at work. A histamine challenge test confirmed airway hyper-responsiveness, and colophony-challenge demonstrated a 16.7% drop in peak expiratory flow rate (PEFR), supporting a diagnosis of colophony-induced occupational asthma. At review, the patient presented with cough, dyspnoea and wheeze that occurred acutely when exposed to the fumes from burning incense during Easter Saturday services, necessitating his departure from the church. Inhalation challenge tests using two blends of incense used at his church (Greek and Vatican) led to identical symptoms and a significant reduction in forced expiratory volume in 1 s 15 min after exposure and PEFRs up to 48 h after exposure, indicating an early and late phase asthmatic reaction. This is the first report of coexistent colophony and incense-induced asthma. The similarities in chemical structures between abietic acid in colophony and boswellic acid in incense suggest a common mechanism.

BACKGROUND

Occupational asthma (OA) is a disease characterised by variable airflow limitation and/or airway hyper-responsiveness due to causes and conditions attributable to a particular occupational environment. OA accounts for up to 6% of all cases of asthma and is more frequent in men and smokers.

Colophony is derived from resins from the bark of pine. Colophony-associated asthma is one of the commonest causes of occupational asthma. The responsible antigen in colophony is abietic acid. Incense, otherwise known as gum olibanum, is derived from oleogum resins from the Burseraceae species of trees and shrubs that are chemically similar to abietic acid. The constituents of incense include resins such as boswellic acid and albanorexin and other chemicals such as volatile oil, bassorin and plant residue.

Incense has been reported to cause symptoms of coughing and has been reported as a risk factor associated with asthma morbidity. We suspected a relationship between colophony-associated asthma and incense in a patient.

CASE PRESENTATION

A 61-year-old non-smoking man, an electronics lecturer, presented with recurring cough and dyspnoea at work where he was regularly exposed to solder flux. He had endured longer periods of exposure to colophony at increasing concentrations in recent years and, at the time of referral, would even develop symptoms when in contact with colleagues who had been exposed to solder fumes.

Information obtained from the manufacturers of the solder confirmed it to be a multicore tin/lead solder wire containing rosin (colophony)-based fluxes. Physical examination, eosinophil count, chest X-ray, serum IgE and pulmonary function studies were normal. A histamine challenge test demonstrated mild airway hyper-responsiveness (PC₂₀ 8 mg/mL). Peak expiratory flow rate (PEFR) after 1 h of exposure to solder fumes at work fell by 16.7%. A diagnosis of colophony-induced occupational asthma was made.

At review, the patient reported a discrete episode of cough, dyspnoea and wheeze that occurred acutely when exposed to the fumes from burning incense during Easter services on Holy Saturday, necessitating his immediate departure from the church. Sequential inhalation challenge tests using two blends of incense used at his church (Greek and Vatican) led to identical symptoms of cough, dyspnoea and rhinorrhoea and a significant reduction in forced expiratory volume in 1 s (FEV₁) 15 min after exposure (Greek incense 15% reduction in FEV₁, Vatican incense 20% reduction in FEV₁), indicating an early phase asthmatic reaction. His symptoms persisted for 48 h. Inhalation of Greek incense was associated with a 26% reduction in PEFR within 2 h (early allergen response) and a 16% reduction in PEFR, peaking at 19 h after exposure (late allergen response; [figure 1](#)). Inhalation of Vatican incense was associated with a 19% reduction in PEFR within 2 h (early allergen response) and a 16% reduction in PEFR, peaking at 18 h after exposure (late allergen response; [figure 1](#)).

OUTCOME AND FOLLOW-UP

In subsequent months, he reported intermittent cough and dyspnoea on exposure to multiple other sources of colophony (rosin) and related substances, for example, fumes from joss (incense) sticks at an outdoor fair, some household cleaning materials, pine resin from Christmas trees or from sawmills.

DISCUSSION

OA is a disease characterised by variable airflow limitation and/or airway hyper-responsiveness due to causes and conditions attributable to a particular occupational environment and not to stimuli encountered outside the workplace and may account for up to 6% of all cases of asthma.¹ Colophony (rosin) is a natural product derived from the resin of coniferous trees with many industrial applications including soldering fluxes. Exposure to colophony fume through soldering is a common cause of occupational asthma.²

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Figure 1 Peak expiratory flow rates (PEFR) measures after exposure to Greek and Vatican incense. Inhalation of Greek incense was associated with a 26% trough reduction in PEFR within 2 h (early allergen response) and a 16% trough reduction in PEFR, peaking at 19 h after exposure (late allergen response). Inhalation of Vatican incense was associated with a 19% trough reduction in PEFR within 2 h (early allergen response) and a 16% trough reduction in PEFR, peaking at 18 h after exposure (late allergen response).

Oxidised resin acids are present in many rosin products, and have been regarded as the main sensitising rosin compounds. Colophony is the residue left after turpentine is extracted by distillation from pine tree resin. Abietic acid is the most important sensitising agent in colophony-associated asthma. Incense has been used in a religious, social and cultural context by the Mesopotamians and subsequently in Pharaoh, Egypt, ancient Greece and in the Christian era. Incense contains resin, volatile oil, a species of gum called bassorin and plant residue. Boswellic acid is one of the main active components of incense and is chemically similar in structure to abietic acid contained in colophony (figure 2).

Incense is known to cause cough and has been reported as a cause of contact dermatitis.^{3 4} The burning of incense has been associated with an increased prevalence of asthma and wheezing in epidemiological studies from Taiwan, Oman, Kuwait and Qatar.^{5–9} The combination of colophony-induced asthma and asthma due to chemically related incense has not previously

been reported. As well as showing that incense exacerbates work-related colophony-induced asthma outside of work, it is evidence against the marketing of incense as a cure for asthma.

As our patient became sensitised by colophony while soldering at his workplace, he subsequently experiences asthma symptoms after exposure to colophony or related substances in a wide variety of situations including exposure to incense in church. The provocation of symptoms of asthma with colophony and incense in a patient suggests a common mechanism, probably due to chemical similarities between resin acids in incense and abietic acid in colophony. This association of incense with occupational asthma is particularly important in the context of commercial marketing of incense as a therapeutic agent for asthma.

Figure 2 Chemical structures of abietic acid, a component of colophony and β -boswellic acid, one of the main active components of incense.

Learning points

- ▶ Colophony is a common cause of occupational asthma.
- ▶ Incense has been shown in epidemiological studies to be a cause of asthma symptoms.
- ▶ Colophony and incense contain chemically similar constituents that may provoke asthma symptoms.
- ▶ This is the first reported case of incense-induced asthma.

Contributors TMO, RC, SL and CPB managed the patient and wrote the manuscript.

Competing interests None.

Patient consent Obtained.

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