

Thunderstorm asthma: potential danger but a unique opportunity

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Thunderstorm asthma refers to an observed increase in acute bronchospasm cases following the occurrence of thunderstorms in the local vicinity. Evidence suggests these thunderstorm asthma epidemics occurred only during the pollen season, with pollen allergic patients at highest risk. Events have been reported from Europe, North America, the Middle East, and Australia [1]. Previously the largest documented outbreak occurred in June 1994, when 640 patients attended London Emergency Departments within a 30-hour period [2]. This has been greatly surpassed by a recent thunderstorm event in Melbourne, Australia on November 21–22, 2016 as more than 9,900 patients presented to hospitals with asthma attacks. In excess of 2,300 emergency calls were received, and despite valiant efforts of emergency services, 9 deaths have been attributed to this tragic crisis [3]. Just as the Chinese word for “crisis” 危机 (wei ji), is made of 2 characters representing danger (危) and opportunity (机), this episode highlights both etymological meanings of this Chinese word.

Since first described just over 30 years ago, research suggests thunderstorm asthma events result from a complex interaction of environmental and individual susceptibility factors. Known environmental factors include: (i) high concentrations of an

aeroallergen [1]; (ii) rain water to rupture pollen grains, releasing fine (<2.5 μm) allergen-bearing starch-granules respirable to the lower airways [4]; and (iii) thunderstorm outflows which bring respirable allergen particles down to ground level [5]. Individual susceptibility factors include: (i) prior sensitisation to pollen allergen [6], (ii) a history of allergic rhinitis [7], and (iii) lower rate of inhaled steroid use in those with diagnosed asthma [8]. Following the recent outbreak, we conducted a pilot questionnaire study of 344 patients who presented to our Emergency Departments in eastern Melbourne, and received 262 responses (overall response rate 76%). We found that (i) the majority (57%) did not have previous diagnosis of asthma, although most (51%) of these had symptoms suggestive of latent asthma; (ii) rhinitis was highly prevalent in 88% of subjects with 71% of these being moderate to severe; (iii) 46% of cases were born outside Australia with a mean duration of 16.0 ± 11.9 years living in Australia; (iv) there was over-representation of non-Caucasian population, with 27% identifying ethnically as Asian (Chinese, Vietnamese, East or South-East Asian), and 16% as Indian (including subcontinental Sri Lankan, Pakistani or Bangladeshi) [9, 10]. This overrepresentation of those born outside Australia (46%), and being of Asian or Indian ethnicity

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Received: April 23, 2017

Accepted: April 23, 2017

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(43%), is far in excess of that expected in the resident population, and has not been previously described.

There are 2 major issues arising from this recent thunderstorm asthma crisis which are of great interest and relevance to our region and the readers of Asia Pacific Allergy. Firstly, despite considerable advances in asthma management in a developed and technologically advanced country such as Australia, large sections of our community are still highly vulnerable to massive outbreaks of asthma with lethal consequences (danger). Secondly, our recent data corroborate migration studies which suggest that an interaction of genetics with lifestyle and environmental factors in western industrialised countries increases allergy and asthma risk in immigrants from less developed countries [11]. Much research remains to be done to fully understand the individual and population susceptibility risk factors, and this interaction of genetics with environment (opportunity). It also highlights the need and opportunity for collaborative research in the Asia Pacific, as regional mobility and migration potentially increases susceptibility to allergy and asthma.

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