

Asthma prevalence: mysterious enigmatic riddle or time-expired illusion?

Can we solve a riddle by burying an illusion?

OVER THE PAST 40 YEARS, the prevalence of asthma appeared to rise inexorably in both the developed and the developing world. So the report by Robertson and colleagues in this issue of the Journal (*page 273*), showing a decline in reported symptoms in children since 1993,¹ is to be warmly welcomed. It comes with supporting evidence, in the form of reduced hospital admissions for asthma in Victoria, but also with a catch. The prevalence of reported hay fever and eczema has increased over the same period.

Why the prevalence of asthma increased and why it may now be stabilising or declining is baffling. Robertson et al suggest one possibility may be the increased use of daycare facilities. The “hygiene hypothesis” — the inverse relationship between microbial or infection exposure and allergic disease — was first suggested by Gerrard et al while studying allergic disease in the Metis Indian community in Canada.² Strachan refined this observation from large UK cohorts, in which he found an inverse relation between the number of older siblings and the prevalence of hay fever, but *not* asthma.³ He emphasised that the link was through atopy to allergic disease. Several studies have subsequently shown reduced asthma prevalence in school-aged children with early daycare attendance. These children tend to show *more* early wheezing, but less asthma later on. The proposed explanation is that they contract more upper respiratory tract infections from close contact with children, and this leads them to have more early wheezing, but, in turn, protects them from later developing atopy and atopic disease. This explanation seems less likely in the study by Robertson et al, given that the prevalence of hay fever and eczema increased while asthma prevalence decreased. However, one would need to know the atopic status of the children to clarify the issue.

The 26% reduction in current wheeze prevalence in Melbourne, while significant, is within the range found in Australia in phase 1 of the International Study of Asthma and Allergies in Childhood (ISAAC) study. For example, in the four Australian centres that took part, there was a 19% difference between the highest and lowest prevalence. For sleep disturbance and speech limitation, this was 40%.⁴ There is even greater variation in large cities. In Mumbai (Bombay), for example, reported current wheeze varied by more than 100% in different parts of the city. Large cities are not homogeneous, with large variations in many factors that may affect wheezing, such as housing conditions, smoking prevalence, diet and variable access to healthcare. Over time, with gentrification and changes in zoning, factors may vary even in the same narrow geographic location.

Robertson et al also note that awareness of asthma in the community is a determinant of the prevalence of reported symptoms. The pool of individuals with a history of symptoms in any population will be larger than the proportion who report symptoms in a defined period. In a resurvey of 700 young adults, all of whom had 4 years previously responded positively to at least one of three asthma questions, only two-thirds reported symptoms. In the first survey, 28% had responded

positively to all three questions, and in the second, 29%. However, only 60% were the same individuals.⁵ Just how large this pool is has recently been clarified, at least in New Zealand. In a 26-year follow-up of a birth cohort in Dunedin, 73% reported wheezing on at least one occasion and 51% on at least two.⁶ Given that there is likely to be some loss to recall, wheezing at some time between birth and adulthood appears virtually universal. Clearly, most of this wheezing is occasional, trivial, inconsequential, and a normal phenomenon.

It is now easy to see how a change in diagnostic and hence societal emphasis on wheezing, as opposed to bronchitis, with attendant changes in treatment, can enhance recall for asthma in cross-sectional surveys. Perhaps this emphasis is now stabilising and the diagnostic label “asthma” is being applied slightly less frequently in Melbourne.

The strengths of the ISAAC approach — simple questionnaires requiring minimal funding — allow large-scale international comparisons of children (in fact, this is the only way that such large population studies can be conducted), but interpreting relatively small changes over time in a very asthma-“savvy” environment like Australia is more difficult. Although the ISAAC approach clearly shows that reported asthma symptoms are far more frequent in Australia, New Zealand and the United Kingdom compared with, say, Albania or India (more than 10-fold), smaller differences over relatively short time intervals in individual countries are harder to interpret.

In the past 30 years there have been many cross-sectional studies reporting an increase in the prevalence of asthma symptoms over time. In only two has this been accompanied by measures of airway hyperresponsiveness. In the first, in the United Kingdom, Burr et al showed that current asthma symptom reporting had doubled over a 15-year period, but exercise-induced fall in peak expiratory flow rate had not changed.⁷ In the second, Peat et al showed a doubling of current symptoms and airway hyperresponsiveness, predominantly among atopic children, suggesting an increase in asthma relating to greater allergen exposure.⁸ There is a real need for the measurement of objective markers over time in similar populations. The advent of easily obtainable markers of airway inflammation, such as exhaled nitric oxide or constituents of breath condensate, may allow population studies of airway inflammation to be quantified and tracked over time.

Perhaps it is time to abandon our inconvenient population model of asthma as a disease, just as doctors did for essential hypertension in the 1950s.⁹ Nature provides no obvious support for asthma and we can neither define nor measure it accurately; indeed, it remains a mystery because it is largely an illusion. The late Geoffrey Rose (Professor of Epidemiology at the London School of Hygiene and Tropical Medicine) suggested that we should seek the answers to “disease” by exploring populations rather than atypical minorities.¹⁰ We need to consider applying this concept to airway inflammation. Now that appropriate tools are becoming available, we

should measure airway inflammation and airway responses in large populations and explore the environmental and genetic factors that affect the airway at a population level. This might reveal that it is not just the upper end of the distribution of airway inflammation (which we arbitrarily and inconsistently call asthma) that varies by environment, and over time, but the whole distribution.

In the meantime, Robertson and colleagues have shown that parent-reported asthma symptoms of young Melbourne children have declined in the past decade. This may or may not be an early signal for a real decline in asthma prevalence. What it does suggest is that asthma prevalence has not increased, which in itself is a welcome observation.

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