EDITORIAL

Fast food and asthma and allergy: Be afraid, be deeply afraid?

Key words: allergy, asthma, Western diet.

Many hypotheses have been put forward to account for the increase in allergy and asthma over the last 50 years or so, particularly in developed countries with a Western lifestyle. Given that the rise in the prevalence of asthma was relatively rapid, environmental rather than genetic factors seem likely to be responsible. Hypotheses include the direct effects of a Western diet, particularly ‘fast food’, the increased prevalence of obesity (associated with increased energy intake and reduced physical activity), altered early-life immune exposure and the effects of indoor and outdoor air pollution.

The systematic review by Wang et al. focuses on the relationship between fast food (including deep-fried food) and asthma, asthma symptoms, eczema and allergies (including rhino-conjunctivitis) by reviewing the English language scientific literature between 1946 and 2018. Their search was exhaustive, yielding 4138 citations from bibliographic databases, from which the final 16 articles (13 cross-sectional and 3 case-control studies) were selected. The quality scores of the studies included were on average 5–6 out of 11, scoring high for information on source, timing, recruitment consecutiveness and attempts to deal with confounding and response rates, but low on information regarding blinding, quality assurance, missing data and follow-up. Prospective registration was a strength. One of the problems admitted by the authors was the lack of a consistent definition of ‘fast food’. The statistical methods were appropriate—specifically cross-sectional and case-control studies were pooled separately. There was still potential for confounding, although the authors attempted to adjust for body mass index, socio-economic status, urbanization, smoking and parental allergy.

Wang et al. found significant associations between the consumption of fast food and asthma and allergies. The associations were consistent across various definitions of allergy and asthma, across levels of severity and showed a dose-response relationship (days per week of consumption). The consumption of hamburgers (rather than other forms of fast food or high energy drinks) was singled out as a specific food type contributing to the association. The associations between fast food and asthma/wheeze were robust to study design, and associations with secondary endpoints such as rhinitis or eczema were similar. This review strengthens the evidence for the role of fast foods in the rise of asthma and allergy in populations adopting a ‘Western’ diet. The authors have not overstated their findings, concluding that the consumption of fast foods, particularly hamburgers, correlates with asthma and that validation now requires longitudinal and interventional studies. It is likely that this review has probably taken us as far as we can go using the available epidemiological evidence.

The review of Wang et al. not only explores the association between the consumption of fast foods and asthma and allergy, but also provides some guidance to how future studies might pursue this association productively. However, a number of difficulties will need to be addressed: These relate to defining asthma and allergy and fast foods, better accounting for confounders and exploring the temporal relationships between exposure and onset of disease. Does eating fast food cause allergies and asthma or does it simply trigger symptoms in those who already have a disease?

Although there is no single diagnostic test for asthma, it is usually characterized physiologically as variable airway narrowing and pathologically by airway inflammation (eosinophilic and/or neutrophilic or pauci-granulocytic) and airway wall remodelling. Allergy is defined as an IgE-mediated reaction to an environmental allergen (most often airborne) and is characterized by positive prick skin tests or elevated serum IgE levels to specific allergens. None of these characteristics could be assessed in the review of Wang et al. as such data were not collected or examined in the studies selected. Therefore, misclassification remains an issue, as recently highlighted by Aaron et al. This is particularly important for wheezing illnesses which may be confounded by increased body weight and gastrooesophageal reflux, both of which may be associated with consumption of fast foods. The association between obesity and ‘asthma’ is complex and may relate to mechanical changes of the chest wall and lung rather than pathology within the airway wall.

The excessive airway narrowing that occurs in allergic asthma is independently related to non-specific airway hyper-responsiveness (which is related to airway wall pathology) and to the level of the specific allergic response (skin prick test or serum IgE) to the inhaled allergen. It is possible that the consumption of fast food might influence both non-specific airway hyper-responsiveness and allergic sensitivity.

The consumption of fast food has a pro-inflammatory effect and could affect airway responsiveness by increasing airway inflammation. It seems less likely that the consumption of fast food would give rise to the smooth muscle remodelling in asthma which is present early in life, is related to severity, but not to duration of asthma, and is associated with abnormal lung function from infancy, before asthma and atopy are established.

The increase in the prevalence of reported doctor-diagnosed asthma has not been associated with an increase in the prevalence of non-specific airway hyper-responsiveness in the general population. Over
the same time, however, there has been an increase in the prevalence of atopy in the community.\(^2,^3\) Therefore, the increased consumption of fast food might contribute to either mechanism by a broad pro-inflammatory effect, altering responses to ubiquitous allergens, or by exposure to allergens within food. This important review by Wang et al. invites us to explore the various mechanistic possibilities and provides further evidence for limiting the consumption of fast food.

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