ALLERGY, ASTHMA & CLINICAL IMMUNOLOGY

POSTER PRESENTATION

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Does chronic stress predict the development of asthma in pre-adolescents?

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Objective/purpose

Pediatric asthma has risen over recent decades in developed countries, affecting almost 10% of children. Canada ranks near the top of the list of countries with high rates of asthma and allergic diseases. Predicting which children will develop asthma remains a challenge, but both higher weight and stress may play a role. An association between obesity and asthma has been reported in previous studies among adolescents and school-age children; this connection is more apparent in girls. Children exposed to maternal stress in early life are more likely to develop asthma. If the stress exposure becomes chronic and the body is unable to respond appropriately, allostatic load/overload (AL) can develop. AL is defined as the physical price paid by the body under chronic stress. To our knowledge, the impact of AL on the development of asthma in pre-adolescents has not been investigated. The overall aim of this research is to determine the influence of AL on the development of asthma. We hypothesize that (1) exposure to AL increases the risk of developing asthma in pre-adolescence, and (2) the contribution of each AL measure is not equal in predicting the development of asthma.

Methods

This study is a prospective evaluation of children enrolled in a novel birth cohort study, the Study of Asthma, Genes and the Environment (SAGE). Healthy children were recruited in the nested case-control study component of SAGE at the age of 8-10 years and were followed until pre-adolescence (age 12-13) to assess the development of new asthma. At study onset and follow-up, all children were examined by a pediatric allergist to assess the development of asthma; several clinical assessments were made, and a fasting blood sample was taken to assay biochemical markers. We created an index of AL using 7 markers: systolic and diastolic blood pressure, waist-to-hip ratio, total cholesterol, high density lipoprotein cholesterol (HDL), cortisol & dehydroepiandrosterone sulphate (DHEAS). An AL score was created for each child by summing the number of biomarkers in the top quartile; higher score = higher level of stress.

Findings

A total of 477 children without asthma were recruited into the study at age 8-10. Overall, 10.1% of the 306 children followed until the age of 12-13 years developed asthma. At age 8-10 years, 18.7% of children had an AL score higher than 2. There was no statistically significant difference between the mean AL score according to sex, urban/rural location and family history of asthma (all $p > 0.05$). However, overweight children had significantly higher mean AL scores compared to non-overweight children ($p < 0.001$). None of the risk factors of sex, urban/rural residence, overweight or family history of asthma at baseline had a relationship with asthma development after the follow up period (all $p > 0.05$). Subsequent analyses are planned to determine the association between AL and the development of asthma in logistic regression models, which adjust for these factors and additional covariates.

Deliverables

This research provides a measure of 7 physical and biomedical components, which can be routinely measured in all children and has the potential to be used as a marker to identify children at risk for developing asthma in the future. We also provide a statistical model that can predict the probability of asthma development regarding the AL score after adjusting for other possible covariates for each individual.

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Relevance

Using AL as a predictor of asthma in school-aged children could provide clinicians with an opportunity to implement interventions aimed at preventing asthma. From a practical standpoint, developing a parsimonious model of AL would be the most useful and easiest for clinicians to adopt in their everyday practice.

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