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The association between asthma and rhinitis is stable over time despite diverging trends in prevalence

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Summary
Background: Despite the well-known association between asthma and rhinitis, in Swedish adults the prevalence of rhinitis rose from 22% to 31% between 1990 and 2008 while asthma prevalence was unchanged. We tested whether the association of rhinitis with asthma was stable over time using the same population-based databases.
Methods: Two surveys of adults (20–44 years) living in three regions of Sweden, carried out in 1990 (n = 8982) and 2008 (n = 9156) were compared. Identical questions regarding respiratory symptoms, asthma and rhinitis were used. Asthmatic wheeze: Wheeze with breathlessness

Abbreviations: ECRHS, European Community Respiratory Health Survey; GA2LEN, Global Allergy and Asthma European Network; OR, odds ratio; CI, confidence interval.

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apart from colds. Current asthma: Asthma attacks and/or asthma medication use.
Results: Subjects with rhinitis had level time trends in asthmatic wheeze, current asthma and most nocturnal respiratory symptoms between 1990 and 2008, adjusted for age, sex, area and smoking. Any wheeze however decreased slightly. In never-smokers asthma symptoms were similarly associated with rhinitis in 1990 and 2008: any wheeze OR 4.0 vs. 4.4 ($p = 0.339$); asthmatic wheeze OR 6.0 vs. 5.9 ($p = 0.937$); and current asthma OR 9.6 vs. 7.7 ($p = 0.213$). In the whole population there were decreases in the asthma symptoms most closely associated to smoking, which decreased by half 1990—2008. Conversely current asthma, which was strongly associated with rhinitis and not with smoking, increased ($p < 0.001$).
Conclusions: The association of rhinitis with asthma was stable between 1990 and 2008. The pattern in the time trends of asthma outcomes strongly suggests that decreased smoking counterbalanced the driving effect of increased rhinitis on asthma prevalence. The findings illustrate the public health benefits of decreased smoking.

Introduction

Asthma and symptoms from the lower airways are closely associated to rhinitis [1]. In westernised countries a majority of adults with asthma also have rhinitis, and it is almost ubiquitous in adult-onset asthma [1—4]. The two diseases also share several pathophysiological features and are both closely related to allergic sensitization, which has led to the concept of a "united airways disease" [2,5,6]. Increases in the prevalence of asthma and rhinitis since the 1960s have rendered them serious public health issues [7].

Despite the close clinical, epidemiological, and mechanistic associations between the two conditions, some recent studies have demonstrated isolated increases in rhinitis, while the prevalence of asthma has remained level [8—10]. To date, the most reliable way to study time trends is by applying identical methods to similar, representative samples from the population on two or more occasions [11]. In contrast to in children, there are comparatively fewer such studies in adults [9,10,12,13].

Using two large population-based surveys in the same areas we found a substantial increase in the prevalence of rhinitis from 21.6% to 30.9% ($p < 0.001$) between 1990 and 2008, with no corresponding increase in asthma symptoms [8]. These observations could indicate that the association between asthma and rhinitis changed during the time period. To our best knowledge the stability of the association between asthma and rhinitis has not been studied over time using repeated population surveys. The aim of the present study was to describe in detail the association between asthma symptoms and rhinitis and to test its stability over time.

Material and methods

Study design and study population

The design, methodology and population of this study have been described in detail previously [8,14]. In brief, we analysed data from two large population-based surveys: In 1990, Sweden participated in the European Respiratory Health Survey (ECRHS) by inviting 10,800 adults aged 20—44 years in three centres, of which 86% participated [15]. In 2008, the four Swedish centres in the Global Allergy and Asthma European Network (GA^{2}LEN) invited 45,000 adults aged 16—75 years, with 60% participation [16].

The age intervals (20—44 years) and study areas (Gothenburg, Uppsala and Umeå) that were surveyed both years were included in the present analysis. After elimination of incomplete questionnaires, data from 8982 (52% female) subjects in 1990 and 9156 (57% female) subjects in 2008 remained. The same core questions on respiratory symptoms, asthma and rhinitis were used both years. In 1990, the three local Ethics Committees and the Swedish Data Protection Board approved of the study. The 2008 study and the present comparison study were approved of by the Regional Ethical Review Board in Uppsala.

Definitions and statistical analyses

The ECRHS definitions and validations against objective measures have been thoroughly described previously [15,17]. All definitions used in the comparison study have been published [8] and only those of special relevance are listed below. Prevalence was defined as presence in the last 12 months.

"Any wheeze": Wheeze or whistling in the chest.
"Asthmatic wheeze": Positive answers to the three questions "Any wheeze", "Wheeze with breathlessness" and "Wheeze without a cold" [8].
"Current asthma": A positive answer to the question "Do you have asthma?" and to either or both of "Asthma attack" and "Use of asthma medications" [8].
"Asthma symptoms" and "Asthma symptom score": An arbitrary score for asthma symptoms was calculated by adding one point (total 0—8) for each of the following asthma symptom items [8]: Any of "Any wheeze" or "Wheeze with breathlessness" or "Wheeze without a cold" (1 point); "Asthmatic wheeze" (1 point); "Asthma attack" (1 point); "Use of asthma medications" (1 point); "Current asthma" (1 point); "Nocturnal chest