



Asthma and allergic rhinitis increase respiratory symptoms in cold weather among young adults

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Summary

Background: The occurrence of cold temperature-related symptoms has not been investigated previously in young adults, although cold weather may provoke severe symptoms leading to activity limitations, and those with pre-existing respiratory conditions may form a susceptible group. We tested the hypothesis that young adults with asthma and allergic rhinitis experience cold-related respiratory symptoms more commonly than young adults in general.

Methods: A population-based study of 1623 subjects 20–27 years old was conducted with a questionnaire inquiring about cold weather-related respiratory symptoms, doctor-diagnosed asthma and rhinitis, and lifestyle and environmental exposures.

Results: Current asthma increased the risk of all cold weather-related symptoms (shortness of breath adjusted PR 4.53, 95% confidence interval 2.93–6.99, wheezing 10.70, 5.38–21.29, phlegm production 2.51, 1.37–4.62, cough 3.41, 1.97–5.87 and chest pain 2.53, 0.82–7.79). Allergic rhinitis had additional effect especially on shortness of breath (7.16, 5.30–9.67) and wheezing (13.05, 7.75–22.00), some on phlegm production (3.69, 2.49–5.47), but marginal effect on cough and chest pain.

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Interpretation: Our study shows that already in young adulthood those with asthma, and especially those with coexisting allergic rhinitis, experience substantially more cold temperature-related respiratory symptoms than healthy young adults. Hence, young adults with a respiratory disease form a susceptible group that needs special care and guidance for coping with cold weather.

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Introduction

Asthma is a common chronic disease worldwide, its prevalence being among Finnish adults 7–9% [1,2]. It presents a considerable burden to public health in terms of morbidity and disability [3]. The prevalence of asthma has been found to increase in many parts of the world, including Finland [4]. The prevalence of allergic rhinitis is even higher being 10–40% and it has also been reported to increase [5–8].

Most populations living in the northern hemisphere are recurrently and significantly exposed to subfreezing outdoor temperatures. Exposure to cold air occurs during occupational or leisure time activities or while commuting [9]. Cold weather and the subsequent facial and respiratory tract cooling or inhalation of dry air commonly causes respiratory symptoms (25–29% among 25–75 year old) in the general population [10] and these effects are aggravated during exercise [11] and may even lead to the development of asthma among elite outdoor athletes [12]. Population-based studies have shown that respiratory symptoms in cold are experienced manifold by people with a respiratory disease, such as asthma or chronic obstructive pulmonary disease [13–15] and especially during exercise. [16] Sensitivity to cold in asthmatics has further been confirmed in clinical provocation studies employing hyperventilation and cold dry air [17,18] or during exercise tests in cold weather [11,19,20]. Furthermore, provocation studies have shown that a decrease in temperature increases symptoms of allergic rhinitis (AR) [21] and nasal responsiveness to cold exposure is even stronger in subject with asthma and AR compared with those having rhinitis alone [22].

There is epidemiologic evidence that cold temperatures may affect both functional and working ability of individuals, especially of those with underlying diseases such as asthma and chronic obstructive pulmonary disease [14–16,23]. In a study of middle-aged and older subjects the prevalence of cold-related respiratory symptoms was 25% among men and 29% among women [10] and asthmatics reported symptoms more commonly compared to healthy subjects [14,15]. Wintertime cold temperatures have been associated also with increased exacerbations of asthma [24] and even increased mortality from respiratory diseases [25]. However, no previous study has investigated the effects of cold temperature on respiratory health among young adults.

To our knowledge population-based studies examining the separate and combined effects of asthma and AR on cold-related respiratory symptoms do not exist. Especially knowledge of cold weather-related symptoms among young adults with asthma and AR are lacking. Experiencing respiratory symptoms related to cold weather might lead to avoidance of outdoor activities or reduced performance in cold [13]. These may have a negative impact on the

everyday life of people with respiratory health problems. Furthermore, the relation of allergic rhinitis together with asthma to cold-related symptoms has not been addressed before. With more knowledge on the cold-related respiratory symptoms public health personnel and clinicians can provide instructions for those who have asthma and/or allergic rhinitis on how to maintain and improve their ability to function in cold. This will eventually contribute to reducing cold-related respiratory morbidity and mortality.

The objective of the present study was to investigate the relations of asthma and allergic rhinitis to the occurrence of cold weather-related respiratory symptoms in young adults. We hypothesized that subjects with asthma and/or allergic rhinitis are more prone to experience cold-related symptoms than subjects without these conditions and that this susceptibility can be detected already in young adulthood.

Methods

Study design and study population

This study was a population-based study of young adults 20–27 years old in 2010–2011, when the data collection was conducted. This study was approved by the ethics committee of the Oulu University Hospital.

The study population was formed of subjects who participated in the 20-year follow-up survey of the Espoo Cohort Study. The source population for the Espoo cohort included all children living in the city of Espoo born between January 1, 1984 and December 31, 1989. Espoo is the second largest municipality in Finland, with a population of 252,730 in 2012, located across the western border of Helsinki (60°N, 24°E). In 2010 there were four months and 2011 three months with the mean temperature being below 0 °C [26]. A parent-administered baseline questionnaire was distributed in March 1991 to a random sample of children drawn from the roster of Finland's Statistical Center [27]. The baseline study population included 2568 children whose parents filled in the questionnaire (response rate 80.3%). In March 1997, we conducted a 6-year follow-up survey of the cohort with a follow-up rate of 77.3% [28]. In 2010–2011 we conducted the 20-year follow-up directed at 2534 members of the cohort for whom the Population Registry provided a contact address. A total of 1623 subjects answered the self-administered follow-up questionnaire (response rate 64.0%) and these subjects form the study population for this part of the study.

Determinants of interest

Current asthma and allergic rhinitis were studied as the determinants of interest. Current asthma was defined as

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