

Age-specific incidence of new asthma diagnoses in Finland

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Clinical Implications:

- Age-specific incidence of asthma remains poorly known. On the basis of novel asthma medication reimbursement data in Finland, we report that asthma incidence is highest in children and in aged persons and most diagnoses of persistent asthma are made in adulthood.

TO THE EDITOR:

Age-specific incidence of asthma across all age groups remains poorly known.^{1,2} Recently, in the United States it was reported that adult-onset asthma becomes the dominant phenotype among women by age 40 years.¹ Cluster analyses have suggested that patients with asthma can be divided into different phenotypes and the age at disease onset is a key differentiating factor between phenotypes.²⁻⁴ The estimated adult incidence of asthma from pooled general population studies has been reported to be 4.6 cases per 1000 person-years in females and 3.6 cases per 1000 person-years in males.⁵ This estimate is based on small prospective cohorts or retrospective cross-sectional studies often with limited age span. Higher yearly incidences of newly diagnosed asthma in early adulthood, correlating with earlier lung function abnormalities in childhood, have been reported from the Tucson birth-cohort study.⁶ In many studies, the diagnosis of asthma has been based on questionnaire or interview,⁶ leading to a possibility of misdiagnosis of asthma. The current GINA guideline⁷ advocates the use of objective lung function tests to diagnose asthma.

To evaluate the relative contributions of diagnoses of persistent asthma made either in childhood or in adulthood as well as to estimate age-specific incidence of asthma, we analyzed the number of patients entitled to new special asthma medication reimbursement (referred here as asthma reimbursement) in Finland during the period 2012 to 2013. In Finland, every patient with persistent asthma is entitled to asthma reimbursement if specific criteria (see Table E1 in this article's Online Repository at www.jaci-inpractice.org) are met. Data acquisition and methods are described in detail in this article's Online Repository at www.jaci-inpractice.org.

During the period 2012 to 2013, 26,281 new patients were entitled to special reimbursement for their asthma medication (13,941 females and 12,340 males). When data from 2012 and 2013 were pooled, the overall yearly incidence of new asthma reimbursement was 2.52 per 1000 person-years (2.65 in females and 2.38 in males). Of these, only 25.3% belonged to the age group 0 to 14 years, indicating that a vast majority (74.7%) of new patients who obtained asthma reimbursement were older than 15 years (Figure 1, A). If a different age separating childhood and adulthood is used, the corresponding

figures are 30.4% and 69.6% for age groups of 0 to 18 years and 19 years and more, respectively. Of new female patients entitled to asthma reimbursement, more than 81% were 15 years or older. In contrast, more 0- to 14-year-old boys were entitled to asthma reimbursement during childhood, representing 33% of new male patients entitled to reimbursement. The pooled incidence data (Figure 1, B) indicate that in males the incidence of new asthma reimbursement is highest in young boys aged 0 to 9 years but then rapidly declines and rises again only after the age of 30 years. In contrast, the incidence of asthma reimbursement is higher in females than in males, except in young boys (≤ 14 years) and the oldest age group (≥ 75 years) (Figure 1, B). The incidence of asthma reimbursement is more stable in females than in males over the whole age span (Figure 1, B). However, there is lower incidence of asthma reimbursement in women between the ages of 20 and 34 years. Thereafter, the incidence is rising again toward the menopausal transition and postmenopause age (Figure 1, B). This result is supported with a recent study reporting menopause as a predictor of new-onset asthma.⁸ This suggests that hormonal changes may have a role in the development of asthma,⁴ for example, because of increased systemic inflammation when estrogen levels decrease.⁹ The age group by which the proportion of adult (≥ 15 years)-onset disease became dominant (ie, exceeded 50%) was 30 to 34 years in females and 50 to 54 years in males (see Figure E1 in this article's Online Repository at www.jaci-inpractice.org). This is well in line with a recent US-based data reporting that adult-onset asthma becomes the dominant phenotype among women by age 40 years¹ and with the recent cluster analyses suggesting the presence of several adult-onset phenotypes of asthma.²⁻⁴

For health care providers it is important to know the age-specific prevalence of diseases. For example, among patients with asthma, the young boys and older women (≥ 65 years) have been shown to be at a high risk for hospitalization.¹⁰ In 2013 in Finland, there were 230,740 patients entitled to asthma reimbursement (138,511 females and 92,229 males), indicating a prevalence of 4.23% (5.00% for females and 3.44% for males). Of these, only 7.6% belonged to the age group of 0 to 14 years, indicating that a vast majority (92.4%) of patients who have asthma reimbursement were older than 15 years. Of female patients entitled to asthma reimbursement, more than 95% were 15 years or older. In contrast, more boys were entitled to special asthma reimbursement during childhood, representing 12% of males entitled to reimbursement.

There is evidence that the asthma initiating at adulthood rarely remits.¹¹ In contrast, variable remission rates from less than 10% to 75% in childhood asthma have been reported.^{12,13} That should lead to a decrease rather than an increase in the prevalence of asthma if most of asthma is diagnosed in childhood. The age-specific prevalence (Figure 2) of asthma reimbursement in males is higher in young boys aged 0 to 14 years ($\sim 3.2\%$ in the 5-14 age group) but then rapidly declines and rises again after the age of 30 to 35 years, reaching a level of 6.7% in men at age more than 75 years. In contrast, there is continuous increase in the prevalence of asthma reimbursement in females over the whole age span. After the age of 35 years, it clearly

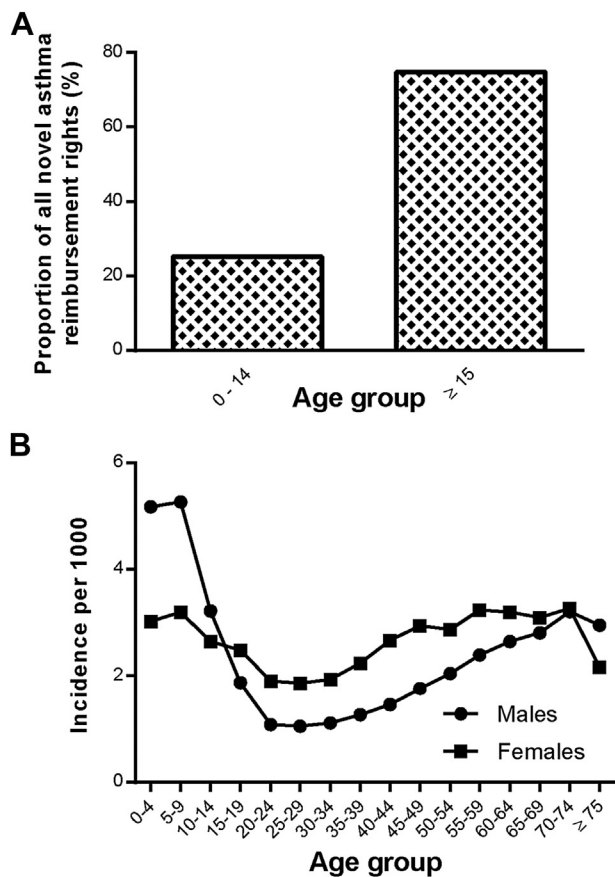


FIGURE 1. **A**, The proportion of patients entitled to novel asthma reimbursement in Finland during the period 2012 to 2013 in persons 0 to 14 years old or more than 15 years old. **B**, The incidence per 1000 of patients entitled to new asthma reimbursements in different age groups in females and males in the period 2012 to 2013 (pooled data) in Finland (population 5.45 million).

exceeds that of males and reaches 9.2% in women 70 years and older (Figure 2).

The present and previous¹ results suggest that the recently characterized adult-onset phenotypes²⁻⁴ of asthma may constitute a majority among all new cases of asthma. Major strengths of the present study are as follows: First, the data represent the whole population in Finland (5.4 million) including both sexes and across all age groups. Second, the physician made the diagnosis of asthma on the basis of objective measurement of lung function (except in small children) as advocated by guidelines.⁷ Third, to obtain the asthma reimbursement, the patient needs to use anti-inflammatory therapy for at least 6 months indicating the presence of persistent asthma. Weaknesses of this study include that patients with very mild or seasonal asthma may be excluded. In addition, the requirement of anti-inflammatory therapy for 6 months as well as different coding practices may underestimate the incidence of asthma especially in small children. It is possible that some patients diagnosed to have new-onset asthma at adult age could have had symptoms of asthma during their childhood. Data on tobacco smoking were not available and thus it is possible that the data may include some patients who have asthma and chronic obstructive pulmonary disease together, that

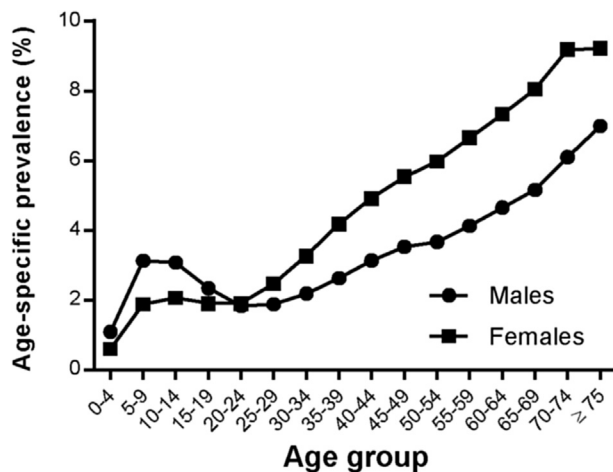


FIGURE 2. The prevalence (%) of patients entitled to asthma reimbursements in different age groups in females and males in 2013 in Finland (population 5.45 million).

is, a disease presentation closely resembling the recently described asthma-chronic obstructive pulmonary disease overlap syndrome.^{7,14}

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