

Original Article

Asthma Medication Ratio Phenotypes in Elderly Women

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What is already known about this topic? The low controller-to-total asthma medication ratio, estimated from drug claims data, was associated with a higher risk of poor asthma control in children and adults. No study addressed specifically the clinical significance of this ratio in elderly individuals.

What does this article add to our knowledge? Both the magnitude and the long-term fluctuations of the controller-to-total asthma medication ratio are able to identify groups of elderly individuals with asthma at an increased risk of poor asthma control.

How does this study impact current management guidelines? We generalized and extended previous studies on the clinical relevance of the controller-to-total asthma medication ratio. Drug claims data provide the opportunity to target poorly controlled asthma, and to implement tailored and timely prevention.

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Abbreviations used

ACO- Asthma-COPD overlap
 AQLQ- Asthma Quality of Life Questionnaire
 ATC- Anatomical Therapeutic Chemical
 BMI- Body mass index
 CI- Confidence interval
 COPD- Chronic obstructive pulmonary disease
 E3N- Etude Epidémiologique auprès de femmes de la Mutuelle
 Générale de l'Education Nationale
 GINA- Global Initiative for Asthma
 ICS- Inhaled corticosteroids
 LABA- Long-acting β_2 -agonists
 LCA- Latent class analysis
 LTRA- Leukotriene receptor antagonists
 MGEN- Mutuelle Générale de l'Education Nationale
 OR- Odds ratio

BACKGROUND: With population aging, further asthma research is needed in the elderly.

OBJECTIVE: We assessed the relevance of the controller-to-total asthma medication ratio and its fluctuations over time to identify participants with a subsequent risk of poor asthma-related outcomes among well-characterized elderly women.

METHODS: We studied 4,328 women with ever asthma (69.6 \pm 6.1 years) from the Asthma-E3N study (Etude Epidémiologique auprès des femmes de la Mutuelle Générale de l'Education Nationale), which combined drug claims data since 2004 with prospective individual characteristics. The levels of the yearly controller-to-total asthma medication ratio from 2004 to 2011 were included in latent class analysis to identify groups of women characterized by specific long-term fluctuations of the ratio. Multiple regression models estimated the subsequent risk of uncontrolled asthma, asthma attacks, asthma exacerbations, and poor asthma-related quality of life associated with the level and the fluctuations of the ratio.

RESULTS: A short-term (12 months) ratio below 0.5 was associated with a higher risk of subsequent uncontrolled asthma, asthma attacks, asthma exacerbations (odds ratio [95% confidence interval (CI)] = 2.13 [1.41; 3.23], 1.51 [1.01; 2.26], and 2.18 [1.37; 3.44], respectively), and a lower total asthma quality of life questionnaire score (β [95% CI] = -0.49 [-0.68; -0.29]). The analysis of the long-term fluctuations of the ratio identified 5 profiles ("Never regular treatment," 53.2%; "Persistent high ratio," 21.8%; "Increasing ratio," 4.4%; "Initiating treatment," 8.8%; "Treatment discontinuation," 11.8%). The subsequent risk of poor asthma-related outcomes was significantly higher in profiles characterized by no or interrupted asthma maintenance therapy over time, compared with the "Persistent high ratio" group.

CONCLUSIONS: The level and the long-term fluctuations of the controller-to-total asthma medication ratio predict poor asthma-related outcomes in elderly women. © 2017 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2017; ■:■-■)

Key words: Asthma; Elderly people; Asthma phenotypes; Asthma medications; Drug claims data

According to the World Health Organization, "aging well" is a global priority.¹ The worldwide burden of aging represents a public health challenge to adapt the quality of care of chronic

diseases, such as asthma. Asthma in the elderly is a heterogeneous disease as prevalent as in the youngest population (5% to 10%) and affecting more often women.²⁻⁵ Asthma in the elderly is marked by poor control, higher rate of mortality, health care use and medical costs related to asthma and multimorbidity, and poorer health-related quality of life than asthma in younger adults.^{2,4} Its management is hampered by multiple factors including misdiagnosis, underdiagnosis, undertreatment, comorbidities such as chronic obstructive pulmonary disease (COPD), and potentially lower drug response.²⁻⁷ Current guidelines for asthma therapeutic management do not consider asthma in the elderly as a specific condition. In addition, older adults are usually not included in randomized controlled trials, limiting the extrapolation of the results to this age group.^{5,8,9}

The global burden of asthma needs ongoing monitoring aiming at identifying patients at high risk of adverse events. Claims data provide the unique opportunity to prospectively follow large populations and identify such patients.¹⁰ Asthma medication ratios calculated from drug administrative data have been developed to assess the asthma quality of care.¹¹⁻¹⁶ These ratios, mainly studied in the US population, have been shown to have a good predictive ability to detect adults with poor asthma-related outcomes in the short term. However, such quality-of-care markers might behave differently in other countries with a different health care system, or in an older population. Moreover, besides the level of this ratio estimated over a specific time window, its long-term fluctuations have never been addressed. It is unknown to what extent these fluctuations over several years could identify specific asthma trajectories related to the subsequent risk of poor asthma-related outcomes.

We prospectively investigated the controller-to-total asthma medication ratio in a unique population-based cohort of elderly women. Our specific aims were: (1) to characterize the controller-to-total asthma medication ratio in elderly women and to identify its determinants; (2) to prospectively assess the relationship of the short-term (12 months) ratio with the subsequent risk of poor asthma-related outcomes; and (3) to prospectively investigate the relationship of distinct profiles of the long-term fluctuations of the ratio with asthma-related outcomes.

METHODS

Population

Analyses were performed among participants with ever asthma from the Asthma-E3N study (Etude Epidémiologique auprès des femmes de la Mutuelle Générale de l'Education Nationale). The Asthma-E3N study (2011-2012) is a nested case-control study on asthma within the E3N study, a prospective study of major chronic diseases among female members of a French national health insurance plan covering mostly teachers, aged 40 to 65 years at inclusion in 1990.^{17,18} All women who reported having ever had asthma (defined by a positive answer to the question "Have you ever had an asthma attack?" as recommended by the American Thoracic Society Epidemiology Standardization Project¹⁹) at least once between 1992 and 2008 (n = 7,100) and confirmed in the Asthma-E3N questionnaire were included in the analyses.^{17,18,20} In addition to detailed questionnaires, dispensings for nonhospital medications were comprehensively collected from the Mutuelle Générale de l'Education Nationale (MGEN) database for each woman from 2004 onwards.

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