



Phenotyping asthma in the elderly: allergic sensitization profile and upper airways comorbidity in patients older than 65 years

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ABSTRACT

Background: Data about allergic rhinitis in elderly patients with asthma are lacking.

Objective: To investigate the presence of rhinitis and the role of sensitization of airborne allergens in elderly patients with asthma.

Methods: This was a multicenter cross-sectional study involving subjects at least 65 years old with asthma. Demographic features, comorbidities, and the presence of allergic respiratory disease were retrieved through interview. Skin prick tests for common allergens were performed. Associations of demographic and clinical features were evaluated in relation to asthma control and forced expiratory volume in the first second less than 80% in the total population and in the subgroup with features resembling chronic obstructive pulmonary disease.

Results: Of 368 elderly subjects with asthma, 101 had features resembling chronic obstructive pulmonary disease. Rhinitis was present in 59.0% of subjects (allergic rhinitis in 47.6%), with an age of onset significantly different from that of asthma (49 ± 18 vs 57 ± 18 years). At least 1 sensitization was observed in 52.4% of subjects, more frequently for house dust mite (HDM; 31.8%). The prevalence of poorly and partially controlled asthma was higher in patients sensitized to airborne allergens (odds ratio 1.64, 95% confidence interval 1.03–2.61), in particular to HDM (odds ratio 1.73, 95% confidence interval 1.05–2.85).

Conclusion: Approximately 60% of elderly subjects with asthma had rhinitis, mainly allergic and often untreated, whose onset preceded asthma symptoms by a mean of approximately 10 years. Nonallergic asthma was better controlled than allergic asthma. However, HDM sensitization was greater in subjects with asthma with features resembling chronic obstructive pulmonary disease (39% vs 28%). When restricting analysis to this group, the negative role of HDM in overall asthma control (forced expiratory volume in first second and Asthma Control Test) was significant.

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Introduction

An increasing amount of evidence has shown that asthma prevalence in elderly patients is similar to that in younger patients (range 4.5%–12.7%).¹ The prevalence of atopic sensitization after 60 years of age has been investigated by few studies that estimated it at up to 25%.^{2,3} According to the US 2006 National Center for Health Statistics Report,⁴ the prevalences of allergic rhinitis are 7.8% in people 65 to 75 years old and 5.4% in people older than 75. However,

the Swiss Study on Air Pollution and Lung Disease in Adults (SAL-PADIA) reported a higher prevalence of allergic rhinitis in the elderly (13% in men and 15% in women).⁵ In Italy, Ventura et al⁶ found that rhinitis was present in approximately 17% of patients older than 65 years referred to an allergology unit. Asthma is a common disease affecting individuals across the lifespan. Because of increased longevity, the proportion of individuals at least 65 years old (hereafter referred to as *elderly*) is increasing worldwide. By 2030, elderly individuals will comprise approximately 20% and approximately 36% of the populations in the United States and China, respectively. Given these demographic changes, the fact that asthma is already common in elderly patients, and the inevitable aging of children affected by the “asthma epidemic” in the second half of the 20th century, the impact of asthma in the elderly is expected to be magnified in upcoming decades.¹ Considering that older people are expected to represent up to 17% of the total world population in 2050, the epidemiologic and pharmacoeconomic effects of allergy, asthma, and rhinitis will rapidly increase.⁷

Although the role of allergic rhinitis as a risk factor for asthma is known in pediatric and adult populations, it has not been extensively evaluated in the elderly. Few European data^{8,9} and no Italian data are available about the allergic rhinitis and sensitization profile of elderly patients, in particular those with asthma.

A recent multicenter observational study (Elderly Subjects with Asthma [ELSA]) conducted by the authors in patients older than 65 years with documented physician-diagnosed asthma has highlighted the negative impact of clinical features resembling chronic obstructive pulmonary disease (COPD) on asthma control.¹⁰ As an extended analysis of the same study, the present study investigated the presence of rhinitis and the role of sensitization of airborne allergens in elderly patients with asthma.

Methods

A cross-sectional study was performed from October 2012 to May 2013 in 18 Italian Health Service Pulmonology and Allergy Clinics. Patients with documented physician-diagnosed asthma based on Global Initiative for Asthma (GINA) guidelines¹¹ and at least 65 years old were consecutively enrolled. The study was conducted in accordance with the guidelines of the Declaration of Helsinki and the principles of Good Clinical Practice. The study protocol was approved by the local ethics committees. Informed consent was obtained by all patients enrolled.

A detailed description of materials and methods can be found elsewhere.¹⁰ Briefly, smoking habits, Asthma Control Test scores, and number of severe asthma exacerbations (defined by systemic corticosteroid use for ≥ 3 days and/or hospitalization in the previous year) were recorded. Sensitization and respiratory function were studied with skin prick testing for a standard panel of airborne aeroallergens (grasses, pellitory, ragweed, birch, cypress, olive, *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*, cat and dog epithelia, *Alternaria tenuis*, and *Aspergillus fumigatus*) and forced spirometry testing, respectively. A reversibility test with salbutamol was performed in patients with airway obstruction (defined by the criterion of a ratio of forced expiratory volume in the first second [FEV₁] to forced vital capacity [FVC] lower than the fifth percentile) and a single-breath carbon monoxide diffusion test was performed in subjects with smoking habits and/or irreversible airway obstruction.

The data of the present study provide an extended analysis of the ELSA survey in relation to the pattern of sensitizations, the presence of rhinitis, and its temporal onset compared with asthma.

Diagnosis of Rhinitis

The diagnosis of current rhinitis was made within the previous 12 months, with at least 2 of the following symptoms: repeated

sneezing and itchy nose, blocked nose longer than 1 entire hour, and/or runny nose when not having a cold or the flu.¹²

Treatment was documented as (1) nasally inhaled corticosteroids (nICSs), (2) first-generation antihistamines, (3) at least second-generation antihistamines, or (4) none.

Subjects with COPD-like Asthma

The presence of chronic bronchitis, defined as “symptomatic mucus hypersecretion with cough and sputum daily for at least 3 months over 2 years” and or an impaired carbon monoxide diffusion test result¹³ were the criteria used to define this subgroup of subjects with asthma. Although the previous study, submitted before the GINA update release,¹⁴ defined this group as having asthma-COPD overlap syndrome (ACOS), in the present study this group is defined having as asthma with COPD-like features, because the postbronchodilator FEV₁/FVC ratio less than 0.7 as suggested by the GINA Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria was not used for the ACOS diagnosis.¹⁴

Overall Asthma Control

Additional analysis on asthma control based on the Asthma Control Test described elsewhere¹⁰ was performed to determine the presence or absence of rhinitis and the pattern of aeroallergen sensitization. Moreover, because FEV₁ is considered a strong independent risk factor of exacerbation for poor asthma outcome according to the 2014 GINA update, the same data were analyzed in relation to an FEV₁ less than vs at least 80%.

Statistical Analysis

Differences in demographic, clinical, and pathologic features were tested using common statistical methods for mean and proportion comparisons. Moreover, associations (odds ratios [ORs]) of demographic and clinical features with overall asthma control at 3 levels (well controlled, partially controlled, and poorly controlled) and in relation to an FEV₁ less than vs at least 80% of predicted were assessed using multivariate ordinal logistic (proportional odds) and logistic regression models, respectively. The direction of the rating in the regression was 1 “well controlled” to 3 “poorly controlled.” The results are reported as ORs and their 95% confidence intervals (CIs). Associations of demographic and clinical features were evaluated in relation to asthma control and FEV₁ less than 80% and restricting the analysis to subjects with asthma with COPD-like features. For statistical tests, *P* values lower than .05 were considered significant in 2-tailed tests. All statistical analyses were carried out using STATA 12.0 (STATA Corporation, College Station, Texas).

Results

In total, 368 elderly subjects with a definite diagnosis of asthma were enrolled. Eighteen additional subjects were included in the survey for comparison with the previous data.¹⁰

Table 1 (third column) presents demographic, clinical, and functional data of the study subjects. Rhinitis was present in 59.0% of subjects (allergic in 47.6%, nonallergic in 11.4%), with an age of onset significantly different from that of asthma (mean $\pm$ SD, 49 $\pm$ 18 vs 57 $\pm$ 18 years). At least 1 sensitization was observed in 52.4% of subjects, mainly for more than 1 allergen (31.8%) and more frequently for HDM (31.8%).

Approximately two thirds (59%) of subjects with asthma and rhinitis were without any treatment for rhinitis. An oral antihistamine was the first drug of choice (in 25% of patients) and an nICS was the drug of second choice (in 23% of patients; data not shown). These 2 options were considered in a minority of cases (7%), and when an antihistamine was selected, a first-generation antihistamine was selected in 40% of cases.

Table 1

Demographic and clinical characteristics of subjects with asthma and in relation to COPD-like features

Variables	Categories	Total subjects, n (%) ^a	Without COPD-like features, n (%) ^a	With COPD-like features, n (%) ^a	P value by χ^2 test
Total		368 (100.0)	267 (72.5)	101 (27.5)	
Sex	Men	235 (63.9)	172 (64.4)	63 (62.4)	NS
Age (y)	65–69	122 (33.2)	94 (35.2)	28 (27.7)	.025 ^c
	70–74	126 (34.2)	96 (36.0)	30 (29.7)	
	≥75	120 (32.6)	77 (28.8)	43 (42.6)	
	Mean (SD)	72.4 (5.4)	72.0 (5.3)	73.6 (5.4)	
BMI (kg/m ²)	<25	110 (29.9)	78 (29.2)	32 (31.7)	NS ^c
	25–30	165 (44.8)	117 (43.8)	48 (47.5)	
	≥30	93 (25.3)	72 (27.0)	21 (20.8)	
Tobacco smoking	Nonsmokers	256 (69.9)	199 (74.8)	57 (57.0)	<.019 ^c
	Ex-smokers	93 (25.4)	53 (19.9)	40 (40.0)	
	Smokers	17 (4.6)	14 (5.3)	3 (3.0)	
	Pack-years, mean (SD)	5.0 (9.9)	4.1 (9.3)	7.0 (11.1)	
Age at asthma onset (y)		57.5 (17.9)	57.7 (16.8)	56.9 (20.4)	NS ^d
Asthma control ^b	Poorly controlled	39 (12.3)	23 (10.0)	16 (18.6)	<.001 ^c
	Partially controlled	87 (27.4)	52 (22.5)	35 (40.7)	
	Well controlled	191 (60.3)	156 (67.5)	35 (40.7)	
Rhinitis	Yes	217 (59.0)	154 (57.7)	63 (62.4)	NS
Age at rhinitis onset (y)		49.0 (18.0)	49.0 (17.9)	49.1 (18.2)	NS ^d
Allergic rhinitis	Yes	175 (47.6)	127 (47.6)	48 (47.5)	NS
Nonallergic rhinitis	Yes	42 (11.4)	27 (10.1)	15 (14.9)	NS
Sensitization	Yes	193 (52.4)	140 (52.4)	53 (52.5)	NS
Polysensitization	Yes	117 (31.8)	85 (31.8)	32 (31.7)	NS
HDM	Yes	117 (31.8)	77 (28.8)	40 (39.6)	.048
<i>Parietaria</i> species	Yes	63 (17.1)	44 (16.5)	19 (18.8)	NS
Grass	Yes	72 (19.6)	56 (21.0)	16 (15.8)	NS
Birch	Yes	39 (10.6)	28 (10.5)	11 (10.9)	NS
<i>Alternaria</i> species	Yes	14 (3.8)	12 (4.5)	2 (2.0)	NS
Cat	Yes	24 (6.5)	14 (5.2)	10 (9.9)	NS
Other allergens	Yes	65 (17.7)	47 (17.6)	18 (17.8)	NS
Chronic bronchitis	Yes	94 (25.5)	10 (3.7)	84 (83.2)	<.001
Comorbidity	Yes	290 (78.8)	202 (75.7)	88 (87.1)	.016
Osteoporosis	Yes	76 (29.6)	51 (26.7)	25 (37.9)	.086
Hypertension	Yes	212 (68.6)	145 (64.2)	67 (80.7)	.005
Chronic heart disease	Yes	54 (21.5)	40 (21.7)	14 (20.9)	NS
Diabetes mellitus	Yes	61 (24.3)	41 (21.8)	20 (31.7)	NS
FEV ₁	<80%	165 (44.8)	111 (41.6)	54 (53.5)	.041
	≥80%	203 (55.2)	156 (58.4)	47 (46.5)	

Abbreviations: BMI, body mass index; COPD, chronic obstructive pulmonary disease; FEV₁, forced expiratory volume in first second; HDM, house dust mite; NS, not statistically significant ($P > .05$).

^aColumn percentage.

^bPoorly, partially, and well controlled for Asthma Control Test scores no higher than 15, 16 to 19, and at least 20, respectively.

^cBy χ^2 test for linear trend.

^dBy Kruskal-Wallis 1-way analysis of variance by ranks or Wilcoxon rank-sum test on unmatched data.

Table 1 (fourth and fifth columns) presents demographic, clinical, and functional data of subjects with asthma without and with COPD-like features. Patients with COPD vs those without COPD were older and showed a significantly larger proportion of former smokers, sensitization to HDM, presence of comorbidity, hypertension, and poorly controlled asthma. Ages at onset of rhinitis and asthma were similar between the 2 groups (49.1 ± 18.2 vs 49.0 ± 17.9 years and 56.9 ± 20.4 vs 57.7 ± 16.8 years, respectively).

Factors Associated with Overall Asthma Control

Data are presented in **Table 2**. The prevalence of poorly and partially controlled asthma was higher in patients sensitized to airborne allergens, in particular to HDM, grass, and birch. However, in the final model, only sensitization to HDM was associated with a higher risk of poorly controlled asthma (**Table 3**). Sensitization to airborne allergens was excluded from the final model because of collinearity with specific allergen sensitizations; however, when excluding specific allergen sensitizations from the model, sensitization to airborne allergens was positively associated with poorly and partially controlled asthma (OR 1.64, 95% CI 1.03–2.61, $P = .037$; data not shown). Sensitization to HDM and birch was positively associated with an FEV₁ less than 80%, whereas sensitization to *A. tenuis* was negatively associated (**Table 3**).

Analysis of the other variables confirmed the results of the previous study.¹⁰

Analysis Restricted to Subjects with COPD-like Asthma

When restricting the analysis to subjects with COPD-like asthma ($n = 101$), those sensitized to HDM vs those not sensitized to HDM had a higher risk of uncontrolled asthma at univariate and multivariate ordinal logistic regression analyses adjusted for sex, age, and comorbidity (71.9% vs 51.8%, respectively, $P = .068$; OR 2.15, 95% CI 0.91–5.11, $P = .082$; data not shown). The proportion with an FEV₁ less than 80% was larger for subjects without nonallergic rhinitis than for those with nonallergic rhinitis (57.0% vs 33.3%, respectively, $P = .090$) and for those sensitized to HDM than for those not sensitized to HDM (65.0% vs 45.0%, $P = .060$). According to multivariate logistic regression analysis, age (linear term) and HDM were associated with a higher risk of an FEV₁ less than 80% (OR 1.10, 95% CI 1.01–1.20, $P = .021$; OR 2.95, 95% CI 1.20–7.23, $P = .018$, respectively). No other statistical differences were found.

Discussion

The main findings of the present study are that approximately 60% of Italian elderly subjects with asthma have rhinitis, mainly

Table 2Demographic and clinical characteristics according to level of asthma control (poorly, partially, and well controlled)^a

Variables	Categories	Poorly controlled, n (%) ^b	Partially controlled, n (%) ^b	Well controlled, n (%) ^b	Total, n (%) ^c	P value by χ^2 test for linear trend
Total		39 (12.3)	87 (27.4)	191 (60.3)	317 (100)	
Sex	Men	29 (14.7)	55 (27.9)	113 (57.4)	197 (62.1)	.086
	Women	10 (8.3)	32 (26.7)	78 (65.0)	120 (37.9)	
Age (y)	65–69	15 (14.1)	26 (24.5)	65 (61.3)	106 (33.4)	NS ^d
	70–74	11 (10.3)	37 (34.6)	59 (55.1)	107 (33.8)	
	≥75	13 (12.5)	24 (23.1)	67 (64.4)	104 (32.8)	
	Mean (SD)	72.5 (6.3)	72.1 (5.2)	72.6 (5.4)	72.5 (5.5)	
BMI (kg/m ²)	<25	14 (14.4)	28 (28.9)	55 (56.7)	97 (30.6)	NS ^d
	25–30	13 (9.2)	36 (25.5)	92 (65.2)	141 (44.5)	
	≥30	12 (15.2)	23 (29.1)	44 (55.7)	79 (24.9)	
Tobacco smoking	Nonsmokers	30 (13.7)	60 (27.4)	129 (58.9)	219 (69.3)	NS ^d
	Ex-smokers	7 (8.4)	22 (26.5)	54 (65.1)	83 (26.3)	
	Smokers	2 (14.3)	4 (28.6)	8 (57.1)	14 (4.4)	
	Pack-years	3.4 (8.9)	5.7 (10.8)	5.1 (9.7)	5.0 (9.9)	
Age at asthma onset (y)	Mean (SD)	48.6 (22.6)	54.7 (19.6)	56.7 (16.1)	55.2 (18.1)	NS ^e
Rhinitis	No	17 (12.4)	32 (23.4)	88 (64.2)	137 (43.2)	NS
	Yes	22 (12.2)	55 (30.6)	103 (57.2)	180 (56.8)	
Age at rhinitis onset (y)	Mean (SD)	45.5 (19.3)	45.8 (21.0)	49.1 (17.2)	47.7 (18.6)	NS ^e
Allergic rhinitis	No	20 (11.5)	46 (26.4)	108 (62.1)	174 (54.9)	NS
	Yes	19 (13.3)	41 (28.7)	83 (58)	143 (45.1)	
Nonallergic rhinitis	No	36 (12.9)	73 (26.1)	171 (61.1)	280 (88.3)	NS
	Yes	3 (8.1)	14 (37.8)	20 (54.1)	37 (11.7)	
Sensitization	No	15 (9.5)	39 (24.7)	104 (65.8)	158 (49.8)	.035
	Yes	24 (15.1)	48 (30.2)	87 (54.7)	159 (50.2)	
Polysensitization	No	20 (9.1)	59 (26.9)	140 (63.9)	251 (68.2)	.009
	Yes	19 (19.4)	28 (28.6)	51 (52.0)	117 (31.8)	
HDM	No	21 (9.5)	55 (24.9)	145 (65.6)	221 (69.7)	.001
	Yes	18 (18.8)	32 (33.3)	46 (47.9)	96 (30.3)	
Parietaria species	No	31 (11.7)	75 (28.3)	159 (60)	265 (83.6)	NS
	Yes	8 (15.4)	12 (23.1)	32 (61.5)	52 (16.4)	
Grass	No	25 (10.0)	69 (27.5)	157 (62.6)	251 (79.2)	.022
	Yes	14 (21.2)	18 (27.3)	34 (51.5)	66 (20.8)	
Birch	No	32 (11.3)	75 (26.5)	176 (62.2)	283 (89.3)	.033
	Yes	7 (20.6)	12 (35.3)	15 (44.1)	34 (10.7)	
Alternaria species	No	39 (12.7)	84 (27.4)	184 (59.9)	307 (96.8)	NS
	Yes	0 (0)	3 (30.0)	7 (70.0)	10 (3.2)	
Cat	No	36 (12.2)	79 (26.8)	180 (61)	295 (93.1)	NS
	Yes	3 (13.6)	8 (36.4)	11 (50)	22 (6.9)	
Other allergens	No	35 (13.3)	68 (25.8)	161 (61)	264 (83.3)	NS
	Yes	4 (7.6)	19 (35.9)	30 (56.6)	53 (16.7)	

Abbreviations: BMI, body mass index; HDM, house dust mite; NS, not statistically significant ($P > .05$).^aPoorly, partially, and well controlled for Asthma Control Test scores no higher than 15, 16 to 19, and at least 20, respectively.^bRow percentage.^cColumn percentage.^dBy χ^2 test.^eBy Kruskal-Wallis 1-way analysis of variance by ranks or Wilcoxon rank-sum test on unmatched data.

allergic and often untreated, whose onset preceded asthma symptoms by a mean of approximately 10 years, similar to the data recorded in younger adults.¹⁵ Nonallergic asthma was better controlled than allergic asthma and HDM sensitization was greater in those with asthma with COPD-like features (39% vs 28%). When restricting analysis to only this group, the negative role of HDM in overall asthma control was significant.

Studies performed in non-inner-city populations have reported different percentages of sensitization to airborne allergens, suggesting that 28% to 74% of older adults with asthma are sensitized to at least 1 antigen.^{16,17} In the present study, 52% of subjects with asthma were sensitized to at least 1 airborne allergen. Well-known relations between asthma and upper airway diseases have been consistently observed across various age groups.^{18–21} Pite et al²²

Table 3Statistically significant associations (ORs) among sex, age, sensitization to grass and HDM, comorbidity, presence of COPD-like features, level of asthma control, and FEV₁ using ordinal logistic (proportional odds) and logistic regression models, respectively

Variable	Category	Level of asthma control ^a		FEV ₁ <80% vs ≥80%	
		OR (95% CI) ^b	P value	OR (95% CI) ^b	P value
Sex	Male vs female	1.50 (0.93–2.42)	.100	0.78 (0.50–1.22)	.275
Age (y)		0.98 (0.94–1.02)	.361	1.03 (0.99–1.07)	.156
HDM	Yes vs no	1.73 (1.05–2.85)	.032	1.57 (0.99–2.51)	.056
Grass	Yes vs no	1.73 (0.98–3.03)	.057		
Comorbidity	Yes vs no	1.71 (0.92–3.18)	.088	1.62 (0.95–2.79)	.078
COPD-like features	Yes vs no	2.73 (1.65–4.5)	<.001		

Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; FEV₁, forced expiratory volume in first second; HDM, house dust mite; OR, odds ratio.^aPoorly, partially, and well controlled for Asthma Control Test scores no higher than 15, 16 to 19, and at least 20, respectively.^bAdjusted for all variables listed in table.

reported that approximately 81% of elderly subjects with physician-diagnosed asthma had current rhinitis and that approximately 40% were not diagnosed or treated. The present study found a smaller percentage of physician-diagnosed rhinitis associated with physician-diagnosed asthma (60%). However, the present study, although in a limited number of patients, was not performed in respondents but in consecutive patients referred to a network of allergists or chest physicians involved in the survey. Although the present subjects have been treated properly for asthma,¹⁰ they certainly were undertreated for rhinitis, because only 41% of them used an nICS and/or antihistamines. These results confirm that rhinitis in the elderly is underdiagnosed and undertreated.^{8,22} Moreover, the present data reflect that, when treated, guidelines on rhinitis treatment¹² were ignored. There is consensus in considering an nICS as first-line treatment for moderate to severe allergic rhinitis and chronic rhinosinusitis in the elderly.¹² In the present survey, only 23% of elderly patients affected by rhinitis were treated with an nICS; and when antihistamines were the drug of choice or were combined with an nICS, a first-generation antihistamine molecule (eg, chlorpheniramine, diphenhydramine) was the selected option in approximately 40% even against strong advice.^{23–26} In their previous study, the authors reported a large percentage of elderly subjects with uncontrolled asthma and found that 30% presented COPD-like features, defined by the presence of chronic bronchitis or emphysema.¹⁰ This subgroup of elderly subjects with asthma had worse asthma control. In the present study, COPD-like features in a multivariate model were confirmed to represent a significant factor of poor asthma control (Table 3). The presence of rhinitis was not different between the 2 asthmatic groups (57.7% without vs 62.4% with COPD-like features) without any difference in the proportions of subjects with allergic (47.6% vs 47.5%, respectively) or nonallergic (10.1% vs 14.9%) rhinitis. Although the proportion of sensitized subjects did not differ between the 2 groups (52.4% vs 52.5%), it is of interest that a larger percentage of subjects sensitized to HDM was present in the COPD-like group. According to Huss et al,¹⁷ indoor allergens have a significant effect on elderly individuals and Perret et al²⁷ in a longitudinal population-based study reported a significant interaction between smoking and atopy. In other words, they observed a synergistic effect between active smoking and asthma that varied with atopic status, with a larger percentage of subjects who smoked and had atopy with irreversible airway obstruction. The larger percentage of subjects with sensitization to HDM found among those classified as having COPD-like asthma (with more current and former smokers) might be due to this interaction.

To the best of the authors' knowledge, this is the first study in elderly subjects with asthma reporting on the presence, duration, and treatment of concomitant rhinitis. One can only speculate about the role of rhinitis in asthma development in these elderly subjects. However, in these elderly subjects, its role in asthma control was not significant, in contrast to what is generally reported in young adults.¹² One weakness of this study is that rhinitis was not classified as intermittent or persistent or graded as mild to severe. It is not known whether these subjects with asthma had mild or severe rhinitis and the reported data have indicated a negative effect of moderate to severe rhinitis on asthma.^{28,29} Another point of this study that should be clarified is that "asthma with COPD-like features" was preferred to "ACOS," because the postbronchodilator FEV₁/FVC ratio less than 0.7 suggested by the updated GINA GOLD criteria was not used for the ACOS diagnosis.¹⁴

In conclusion, the main findings of the present study are that approximately 60% of elderly subjects with asthma have rhinitis, mainly allergic and often untreated, whose onset preceded asthma symptoms by a mean of approximately 10 years. Nonallergic asthma was better controlled than allergic asthma. The sensitization to

HDM was greater in asthma with COPD-like features (39% vs 28%) with a significant negative role in overall asthma control.

Appendix

ELSA Study Group Collaborators

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