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Asthma Remission in Adults: Role of Age at Asthma Onset, Smoking, Obesity, and Allergic Rhinitis

Reshed Abohalaka[1] | Selin Ercan[1] | Lauri Lehtimäki[2,3] | Daniil Lisik[1,4] | Saliha Selin Ozuygur Ermis[1] | Linda Ekerljung[1,5] | Helena Backman[4] | Madeleine Rådinger[1] | Bright I. Nwaru[1] | Hannu Kankaanranta[1,3,6]

[1]Department of Internal Medicine and Clinical Nutrition, Institute of Medicine, Krefting Research Centre, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden | [2]Allergy Centre, Tampere University Hospital, Tampere, Finland | [3]Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland | [4]Department of Public Health and Clinical Medicine, Umeå University, Umeå, Sweden | [5]Department of Internal Medicine/Respiratory Medicine and Allergology, The Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden | [6]Department of Respiratory Medicine, Seinäjoki Central Hospital, Seinäjoki, Finland

Correspondence: Reshed Abohalaka (reshed.abohalaka@gu.se)

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To the Editor,

Asthma is a complex disease with varying prevalence, incidence, and phenotypes, influenced by factors like allergies, smoking, obesity, and age of onset [1, 2]. Remission is a key therapeutic goal in asthma. Clinical remission is defined as being free of symptoms, exacerbations, and systemic corticosteroids for at least 12 months, while complete remission includes also switching off asthma pathology [3–5]. Both types of remission can be either on or off maintenance treatment. While clinical remission is now a recognized goal, asthma remission remains poorly understood in the general population. Evidence from two Finnish studies suggests that age at asthma onset affects asthma remission [6, 7], but further data from representative populations are needed to clarify the role of factors like age, gender, allergies, obesity, and smoking in achieving remission [4, 7].

Using the West Sweden Asthma Study (WSAS) [8], we retrospectively evaluated asthma remission from childhood to late adulthood, considering various variables focusing on patient input. In 2008 and 2016, combined, WSAS invited 80,000 adults randomly selected from the general population to complete a self-administered questionnaire on asthma, respiratory symptoms, allergies, and various environmental exposures. A total of 42,621 adults responded, of which 3955 (9.3%) reported having physician-diagnosed asthma (Figure S1). Self-reported three-component asthma remission was defined regardless of previous intervention at baseline as having had asthma but (a) not currently using asthma medication and (b) not having exacerbations or (c) symptoms during the past 12 months [4]. Symptoms evaluated included shortness of breath, wheezing, a chronic productive cough, and waking up due to cough, shortness of breath, or chest tightness. Obesity was defined as having a body mass index (BMI) $\geq 30\,kg/m^2$. Individuals were classified as having allergic rhinitis if they responded affirmatively to the question, "Do you have allergic eye or nose problems (hay fever) or any other allergic rhinitis?" Remission was calculated by dividing participants into 10-year age groups based on their age at asthma onset. A detailed description of the methods is provided in the supplement.

Among the 3538 subjects with asthma and complete data, 679 (19.2%) achieved asthma remission. Those in remission were generally younger, had a lower proportion of women, an earlier asthma onset age, lower BMI and less obesity, lower smoking history, and higher education than those who did not achieve remission (Table 1).

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TABLE 1 | Characteristics of WSAS asthma participants with and without asthma remission.

	All asthma participants ($N=3538$)			Men ($n=1426$)			Women ($n=2112$)		
	No asthma remission ($n=2859$)	Asthma remission ($n=679$)	p	No asthma remission ($n=1106$)	Asthma remission ($n=320$)	p	No asthma remission ($n=1753$)	Asthma remission ($n=359$)	p
Gender (men)	1106 (38.7%)	320 (47.1%)	**<0.001**						
Age (year)	45 (31–59)	43 (30–59)	0.125	45 (31–59)	44 (29–60)	0.124	45 (31–59)	42 (30–57)	0.124
Age at asthma onset (year)	17 (9–37)	11 (5–20)	**<0.001**	14 (6–35)	10 (5–16)	**<0.001**	18 (10–38)	13 (6–24.2)	**<0.001**
Asthma onset <18 years	1353 (50.9%)	439 (70.8%)	**<0.001**	570 (56.3%)	221 (76.7%)	**<0.001**	783 (47.6%)	218 (65.7%)	**<0.001**
BMI (kg/m^2)	25.4 (22.8–28.7)	24.4 (22.2–27.0)	**<0.001**	25.9 (23.6–28.7)	25 (22.8–27.7)	**<0.001**	25 (22.1–28.7)	23.6 (21.5–26.5)	**<0.001**
Ever smokers	747 (27.6%)	162 (24.6%)	**<0.001**	302 (28.3%)	75 (24.2%)	**0.024**	445 (27.1%)	87 (25%)	**0.009**
Current smokers	438 (15.6%)	47 (7%)	**<0.001**	144 (13.2%)	27 (8.5%)	0.063	294 (17.1%)	20 (5.6%)	**<0.001**
Allergic rhinitis	2032 (71.1%)	405 (59.6%)	**<0.001**	790 (71.4%)	201 (62.8%)	**0.003**	1242 (70.8%)	204 (56.8%)	**<0.001**
Obese	528 (18.8%)	76 (11.4%)	**<0.001**	193 (17.7%)	41 (13%)	0.057	335 (19.5%)	35 (10.1%)	**<0.001**
Education (≥12 years)	1175 (41.5%)	314 (46.9%)	**0.011**	400 (36.4%)	123 (38.9%)	0.444	775 (44.7%)	191 (54.1%)	**0.001**

Note: Data were presented as *n* (%) or median (IQR). Participants with allergic rhinitis were those who responded affirmatively to the question, "Do you have allergic eye or nose problems (hay fever) or any other allergic rhinitis?". Obeses participants were considered having BMI ≥30. Bold font indicates $p<0.05$ which was considered statistically significant.
Abbreviation: WSAS, West Sweden Asthma Study.

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Those with a later onset of asthma were less likely to remit than those with early onset, both in men and women (Figure 1A). This decline was observed regardless of the participants' age or the number of years they had asthma (Figure S2A,B). Women with early onset asthma (≤20 years) had less remission if they were ever smokers (Figure 1B). Obese participants with early or obese women with late onset asthma showed lower remission than non-obese participants (Figure 1C). Lastly, early onset

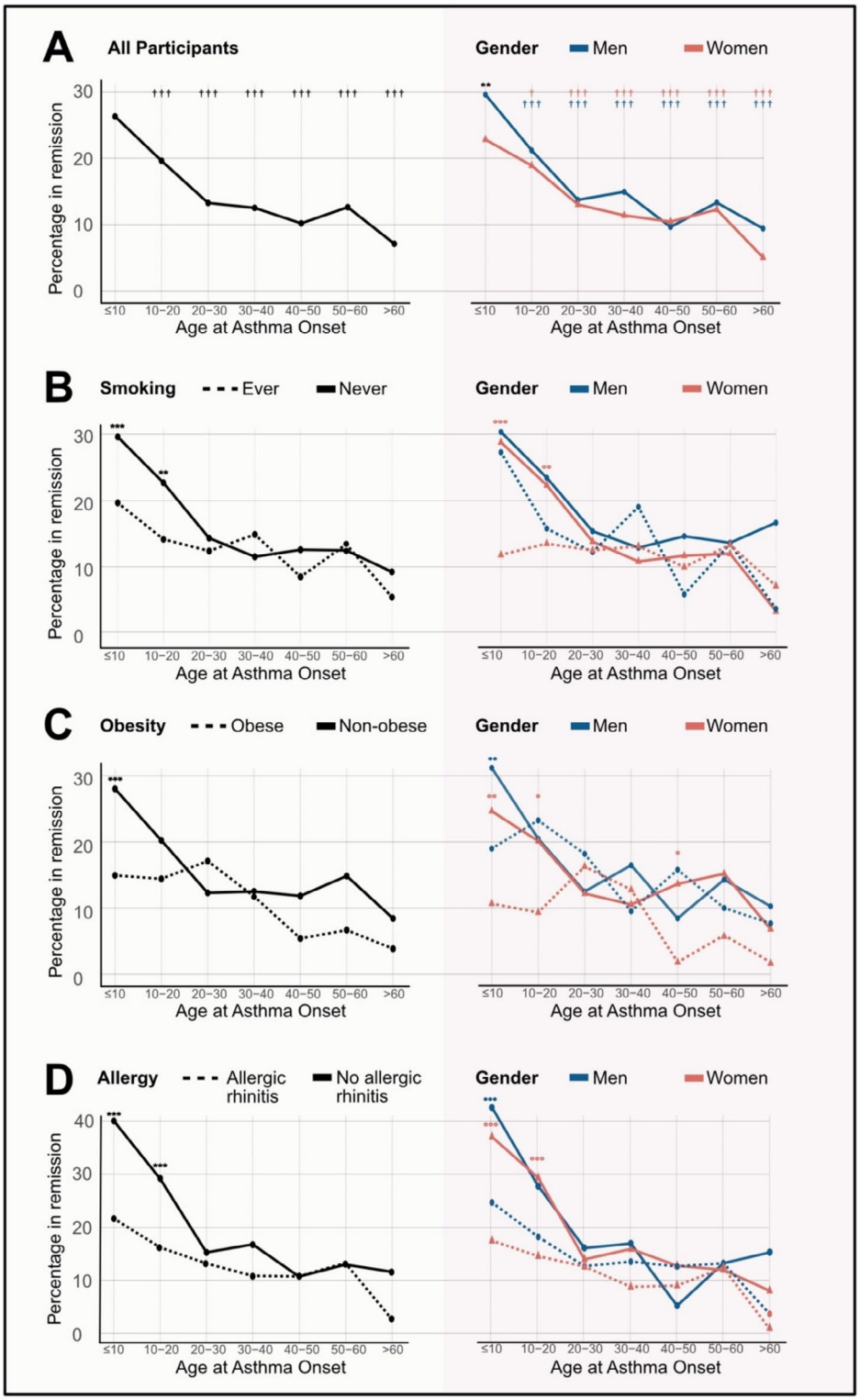

FIGURE 1 | Percentage of individuals with asthma remission, grouped by age at onset in 10-year intervals. Panel (A) shows the whole sample, categorized by gender. Panels (B–D) show remission rates based on smoking, obesity, and allergy status, stratified by gender, respectively. Chi-square test was used for significance comparison. †Indicates difference between age at asthma onset groups and ≤10 years group, *indicates difference between conditions in the same age at asthma onset group in the whole sample, • in men, and ° in women. One symbol indicates $p < 0.05$, two symbols $p < 0.01$, and three symbols $p < 0.001$.

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asthma participants with allergic rhinitis had less remission than participants without, but their remission rates were similar in those with late onset asthma (Figure 1D).

The main limitation of our study is the lack of data on lung function, biomarkers, and previous asthma medication use, and its dependence on self-reported data. This introduces potential bias and makes it difficult to identify how participants reached their remission and if they may still have impaired lung function. Obesity itself can cause respiratory symptoms, even in the absence of active asthma. This may lead to lower observed remission rates in obese individuals. Despite this, our results come from a large, representative population sample. Our data show that several factors hinder asthma remission, especially in women, and fall into two categories: fixed factors like age at asthma onset and allergic rhinitis, and modifiable factors such as obesity and smoking. Targeted interventions are needed to address the latter.

Author Contributions

Conception and design: R.A., L.L., B.I.N. and H.K. Data analysis: R.A., S.E., H.B., B.I.N. and H.K. Data collection: R.A., S.E., L.E., D.L., S.S.O.E., M.R., B.I.N. and H.K. Manuscript writing: R.A. and H.K. Manuscript review and editing all authors.

Conflicts of Interest

R.A. reports travel grants from the American Thoracic Society (ATS), the European Respiratory Society (ERS), the Swedish Heart and Lung Foundation (HLF), and the Adlerbertska foundations, outside the current work. H.B. reports personal fees for Advisory Board work for Chiesi. H.K. reports fees for lectures and/or consulting from AstraZeneca, Boehringer-Ingelheim, Chiesi Pharma, Covis Pharma, GSK, MSD, Orion Pharma, and Sanofi outside the current study. The rest of the authors have no conflicts of interest to declare.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Reshed Abohalaka
Selin Ercan
Lauri Lehtimäki
Daniil Lisik
Saliha Selin Ozuygur Ermis
Linda Ekerljung
Helena Backman
Madeleine Rådinger
Bright I. Nwaru
Hannu Kankaanranta

References

1. R. Abohalaka, S. Ercan, L. Lehtimäki, et al., "Lifetime Asthma Incidence Is Related to Age at Onset and Allergies in Western Sweden," *Clinical and Translational Allergy* 14, no. 12 (2024): e70015.

2. P. Ilmarinen, L. E. Tuomisto, and H. Kankaanranta, "Phenotypes, Risk Factors, and Mechanisms of Adult-Onset Asthma," *Mediators of Inflammation* 2015 (2015): 514868.

3. A. Menzies-Gow, M. Bafadhel, W. W. Busse, et al., "An Expert Consensus Framework for Asthma Remission as a Treatment Goal," *Journal of Allergy and Clinical Immunology* 145, no. 3 (2020): 757–765.

4. A. Shackleford, L. G. Heaney, C. Redmond, P. J. McDowell, and J. Busby, "Clinical Remission Attainment, Definitions, and Correlates Among Patients With Severe Asthma Treated With Biologics: A Systematic Review and Meta-Analysis," *Lancet Respiratory Medicine* 13, no. 1 (2025): 23–34.

5. M. Lommatzsch and J. C. Virchow, "Asthma Remission: A Call for a Globally Standardised Definition," *Lancet Respiratory Medicine* 13, no. 1 (2025): 2–3.

6. L. E. Tuomisto, P. Ilmarinen, O. Niemelä, J. Haanpää, T. Kankaanranta, and H. Kankaanranta, "A 12-Year Prognosis of Adult-Onset Asthma: Seinäjoki Adult Asthma Study," *Respiratory Medicine* 117 (2016): 223–229.

7. J. Honkamäki, P. Piirilä, H. Hisinger-Mölkänen, et al., "Asthma Remission by Age at Diagnosis and Gender in a Population-Based Study," *Journal of Allergy and Clinical Immunology: In Practice* 9, no. 5 (2021): 1950–1959.e4.

8. B. I. Nwaru, L. Ekerljung, M. Rådinger, et al., "Cohort Profile: The West Sweden Asthma Study (WSAS): A Multidisciplinary Population-Based Longitudinal Study of Asthma, Allergy and Respiratory Conditions in Adults," *BMJ Open* 9, no. 6 (2019): e027808.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Figure S1:** Flow chart of West Sweden Asthma Study (WSAS). **Figure S2:** Percentage of individuals with asthma remission, grouped by age at onset in 10-year intervals.

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