

Distribution of Allergy Diagnoses and Cardiometabolic Comorbidities Among Older Adults with EHR-Recorded Allergic Diseases – A Single-Center Retrospective Study

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Purpose: Allergic diseases are frequently underdiagnosed in older adults due to overlapping symptoms with other chronic conditions and age-related changes in the immune system. As the elderly population continues to grow, understanding the prevalence and clinical impact of allergic diseases in this group is essential. This study aimed to assess the prevalence of common allergic conditions in individuals aged 65 and older and to examine their associated comorbidities.

Patients and Methods: We conducted a retrospective chart review of approximately 17,000 patients aged 65 and older who were diagnosed with allergic diseases between January 2020 and December 2023. Data on age, sex, race/ethnicity, specific allergic diagnoses, and comorbid medical conditions were extracted from electronic health records and analyzed descriptively.

Results: Allergic rhinitis and asthma were the most prevalent allergic conditions, affecting 51.2% and 50.3% of the study population, respectively. Food allergies were identified in 8.4% of patients, contact dermatitis in 4.5%, and atopic dermatitis in 2.9%. Comorbidities were most frequent among patients with allergic rhinitis and asthma. Hypertension was the most common comorbidity overall, affecting 77.7% of patients with allergic rhinitis and 77.2% with asthma, followed by coronary artery disease. Rates of allergic disease were higher among patients aged 65–75 compared to those over 75, and prevalence was generally higher in women than in men.

Conclusion: Allergic conditions, particularly allergic rhinitis and asthma, are common in older adults and often coexist with cardiovascular and metabolic comorbidities. These findings underscore the need for increased clinical awareness and tailored diagnostic approaches in elderly populations to avoid missed or delayed diagnoses and to improve management outcomes.

Plain Language Summary: As people live longer, healthcare systems are caring for more adults over the age of 65. While allergies are often thought of as a childhood or young adult issue, they can remain a problem well into older age. In fact, symptoms like sneezing, itchy skin, or breathing problems can be due to allergies, even in people in their 70s and 80s. However, these symptoms are often overlooked because they can also be caused by other health conditions that are common in older adults, such as high blood pressure or heart disease.

In this study, we reviewed the medical records of over 16,000 patients aged 65 and older to find out how common allergies really are in this age group. We focused on conditions like allergic rhinitis (hay fever), asthma, food allergies, and types of skin inflammation. We also looked at other health problems they might have, such as high blood pressure, diabetes, or heart disease.

We found that more than half of older adults in the cohort had allergic rhinitis or asthma. These conditions were especially common in people who also had other chronic illnesses. High blood pressure was the most common overlapping condition.

These findings show that allergies are not rare in older adults and that they often occur alongside other health issues. Doctors should consider allergies more often in older patients to ensure accurate diagnoses and better treatment plans. Recognizing these conditions



can lead to healthier, more comfortable lives for many seniors.

Keywords: allergic rhinitis, asthma, multimorbidity, food allergy, epidemiology, aging population

Introduction

As a result of medical advancements, the proportion of elderly individuals is increasing at an unprecedented rate in industrialized countries. By 2040, people aged 65 years or older will represent about 25% of the entire population, with those over 80 years expected to triple in size.¹ With this demographic shift, an increase in age-related health conditions is expected, including allergic diseases.

The prevalence of allergic diseases in adults aged 65 or older varies across regions. Studies report rates ranging from 5% to 15% of elderly patients affected, while one European cohort found atopy in 26.7% of the elderly population.^{2,3} Recent work has confirmed allergic rhinitis as a common and impactful condition in older adults, with prevalence estimates as high as 20–30% in various European and Asian populations.^{4,5} Furthermore, asthma continues to show strong associations with rhinitis in elderly patients, underscoring the need for comprehensive evaluation in this demographic.⁶

In the Coachella Valley, high allergen levels driven by changing weather patterns, transplanted flora, and increasing pollution may lead to a higher incidence of atopy in the elderly compared to other regions.⁷

Common allergic disorders include allergic rhinitis (AR), asthma, food allergies, atopic dermatitis (AD), and contact dermatitis (CD). However, there is limited data on how these conditions impact older adults, as symptoms can be masked by age-induced physiological changes. Complexities like associated comorbidities make diagnosis and management increasingly challenging in this age group.³ This study aims to address these gaps by examining the prevalence of allergic diseases and comorbidities in the elderly population and their impact on clinical management.

Materials and Methods

This study is a single-center retrospective medical record review of approximately 17,000 patients aged 65 and older, who were seen with allergic diseases between January 1st, 2020, to December 31, 2023. Data were extracted from Electronic Health Records (EHR), focusing on patient demographics including age, gender, race and ethnicity. Patients were specifically selected for their diagnosis of AR, asthma, AD, CD, and food allergy. Additionally, relevant comorbidities including obesity, CAD, HTN, atrial fibrillation (AFib), myocardial infarction (MI), diabetes (DM), and heart failure (HF) were analyzed for possible correlations and impact on future management. These diagnoses were determined by treating physicians during clinical visits based on their clinical judgement, which generally incorporates standard practice and relevant guidelines. Diagnostic approaches may have included patient history, physical examination, and, when appropriate, diagnostic testing (such as skin prick tests or measurement of specific IgE), but specific criteria might have varied by practitioner and clinical scenario. This study complies with the principles outlined in the Declaration of Helsinki.

Results

Prevalence of Allergic Diseases

Among the total of 16,696 patients that were included in this study, a significant proportion were diagnosed with various allergic diseases (Table 1). AR was the most prevalent (8555 patients; 51.2%), followed by asthma (8390 patients; 50.3%). These findings are consistent with prior single-center studies reporting a high burden of allergic diseases in elderly populations.⁸ Food allergies were identified in 1407 (8.4%), CD in 759 patients (4.5%), and AD in 479 patients (2.9%). The findings highlight a high frequency of AR and asthma in patients. To illustrate the coexistence of allergic conditions, a Venn Diagram was constructed to show the overlap among AR, asthma, food allergies and skin diseases (AD + CD) (Figure 1), with AR + asthma representing the most common combination.

Table 1 Prevalence of Allergic Diseases Among Cohort

Allergic Disease	Patient Number	Prevalence (%)
Allergic Rhinitis	8555	51.2%
Asthma	8390	50.3%
Food Allergy	1408	8.4%
Contact Dermatitis	759	4.5%
Atopic Dermatitis	479	2.9%

Comorbidities

The analysis of comorbid conditions revealed that patients with AR and asthma had the highest comorbidity burdens (Figure 2). In order to reflect disease specific prevalence, percentages were calculated using the number of patients within each allergic disease group as the denominator. Individual patients can have multiple allergic or comorbid diagnoses, therefore being represented in more than one category. Through this approach, we assure that the reported values represent the proportion of patients with each allergic disease who also had the respective comorbidity.

Among patients with AR, 22.9% had obesity, 25.2% had DM, 17.8% had HF, 34.2% had CAD, 77.7% had HTN, 22.7% had AFib, and 7.4% had MI. Patients with asthma exhibited comparable rates with 25.5% having obesity, 28.6% DM, 21.7% HF, 33.6% CAD, 77.2% HTN, 24.2% AFib, and 8.5% MI (Table 2). In contrast, patients with AD, CD, and food allergies demonstrated lower overall comorbidity prevalence. In all allergic diseases, HTN emerged as the most

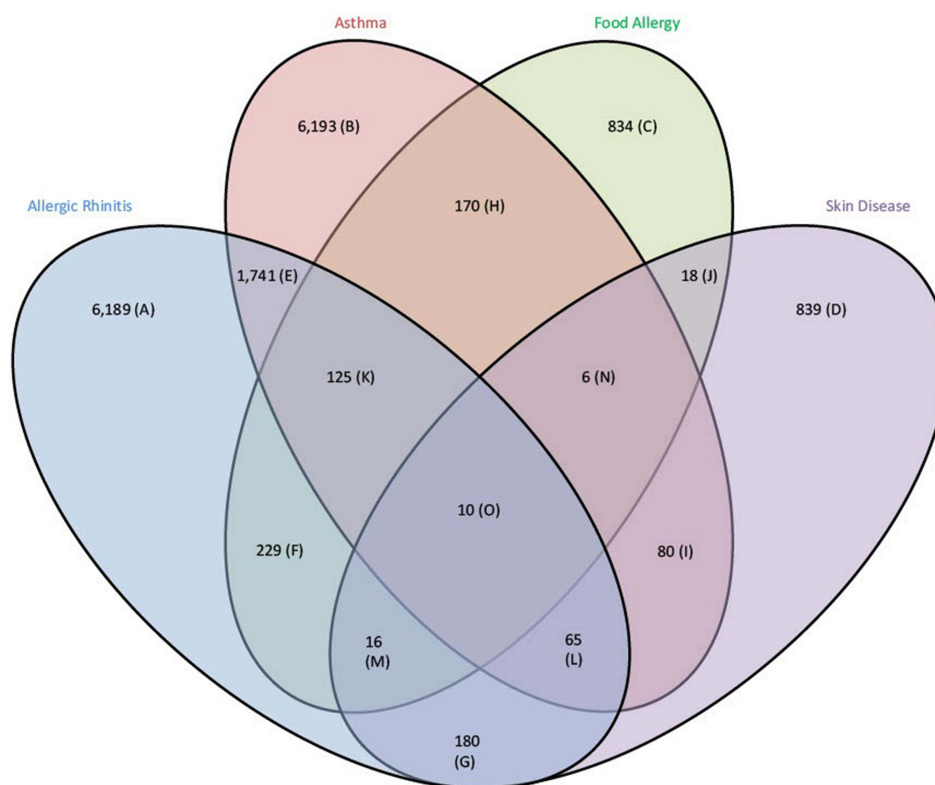


Figure 1 Overlap Among Allergic Rhinitis (AR), Asthma, Food Allergy, and Skin Diseases (Atopic Dermatitis [AD] + Contact Dermatitis [CD]). Letter labels (A-O) represent individual and overlapping patient groups as follows: A = AR only, B = Asthma only, C = Food only, D = Skin only, E = AR + Asthma, F = AR + Food, G = AR + Skin, H = Asthma + Food, I = Asthma + Skin, J = Food + Skin, K = AR + Asthma + Food, L = AR + Asthma + Skin, M = AR + Food + Skin, N = Asthma + Food + Skin, and O = All four (AR + Asthma + Food + Skin).

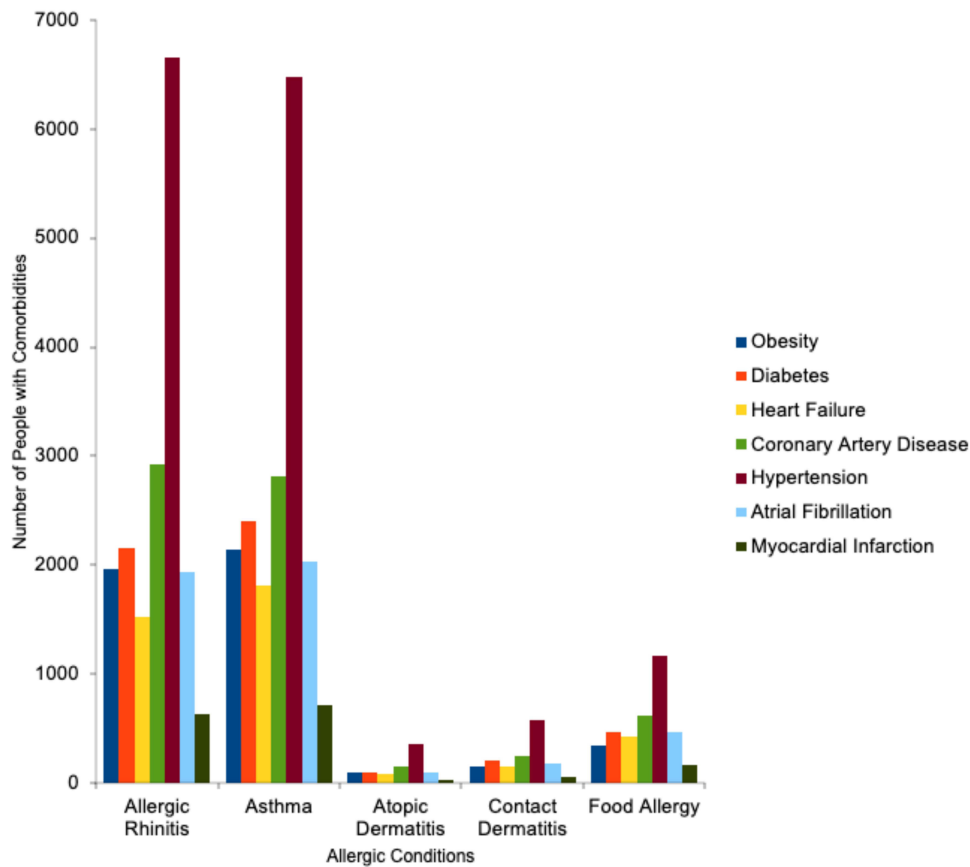


Figure 2 Comorbidities among Patients with Allergic Diseases: Indicating HTN and CAD as the predominant conditions.

common comorbidity, followed by CAD (Figure 1). These findings showcase the significant cardiovascular burden among elderly patients with allergic diseases, particularly those with AR and asthma.

Age-Based Analysis (65 and Older)

The study population had a median age of 74 with an interquartile range of 69–79 years. In age-based analysis, patients between the ages of 65–75 had higher rates in every allergic disease compared to those over 75 (Table 3). Specifically, 58.7% (n = 5023) patients aged 65–75 had AR, compared to 41.3% (n = 3532) in those over 75. Similarly, 59.2% (n = 4968) patients aged 65–75 were diagnosed compared to 40.8% (n = 3422) in those over 75.

Table 2 Prevalence of Comorbidities in Allergic Diseases in the Cohort (% , n)

	Allergic Rhinitis	Asthma	Atopic Dermatitis	Contact Dermatitis	Food Allergy
Obesity	22.9 (1963)	25.5 (2138)	20.5 (98)	19.7 (149)	24.1 (340)
DM	25.2 (2158)	28.6 (2400)	21.9 (105)	28.0 (212)	33.5 (472)
HF	17.8 (1521)	21.7 (1819)	17.1 (82)	19.9 (151)	30.3 (426)
CAD	34.2 (2925)	33.6 (2820)	33.6 (161)	33.4 (253)	44.2 (622)
HTN	77.7 (6646)	77.2 (6479)	76.0 (364)	75.6 (573)	83.0 (1168)
AFib	22.7 (1941)	24.2 (2027)	21.5 (103)	24.3 (184)	33.1 (466)
MI	7.4 (630)	8.5 (716)	6.7 (32)	7.4 (56)	12.0 (169)

Table 3 further quantified these differences using logistic regression. Patients aged 65–75 had slightly higher odds of AR (OR 1.08, $p = 0.017$) and asthma (OR 1.14, $p < 0.001$) compared with those over 75 years. Food allergy was significantly less common in patients age 75 and over (OR 0.71, $p < 0.001$), while the other skin-related allergic conditions showed no meaningful age-related differences. Overall, these results suggest that respiratory allergic diseases are more prevalent among the younger subset of older adults, whereas the prevalence of food allergy appears to decrease.

In order to confirm that the robustness of these results was not dependent on the specific age cutoff, a sensitivity analysis was performed shifting the age cutoff to 70 years. Findings were consistent, asthma continued to be more common in the younger patients (OR 1.10, $p = 0.006$), and food allergy was less common in older adults (OR 0.79, $p = 0.001$).

Patient Demographics

Gender

Female patients exhibited a higher prevalence of allergic diseases compared to males with the exception of atopic dermatitis (**Table 4**). For example, 59.8% ($n = 5017$) of females had asthma, 55.2% ($n = 4719$) had AR, and 49.3% (236) had AD. In comparison, 40.2% ($n = 3373$) of male patients were diagnosed with asthma, 44.8% ($n = 3836$) had AR, and 50.7% ($n = 243$) had AD.

Race and Ethnicity

As shown in **Table 5**, white patients exhibited the highest prevalence in all categories of allergic diseases: 89.1% ($n = 7629$) had AR, 85.3% ($n = 7153$) had asthma, 88.5% ($n = 424$) had AD, 88.7% ($n = 672$) had CD, and 88.2% (1242) had food allergies. The lowest prevalence was observed in Native Hawaiian or other Pacific Islander, representing $\leq 0.2\%$ of cases across all allergic diseases. When analyzed by ethnicity, non-Hispanic or Latino patients accounted for the majority of allergic diseases, representing 89% or more of each condition, whereas Hispanic or Latino patients comprising approximately 5–8% of cases (**Table 6**).

Table 3 Age Based Analysis of Allergy Prevalence (% , n)

Allergic Disease	Age 65–75	Age 75+
Allergic Rhinitis	58.7 (5023)	41.3 (3532)
Asthma	59.2 (4968)	40.8 (3422)
Atopic Dermatitis	55.5 (266)	44.5 (213)
Contact Dermatitis	56.7 (430)	43.3 (328)
Food Allergy	50.6 (713)	49.4 (695)

Table 4 Prevalence of Allergy Diseases by Sex (% , n)

Allergic Disease	Female	Male
Allergic Rhinitis	55.2 (4719)	44.8 (3836)
Asthma	59.8 (5017)	40.2 (3373)
Atopic Dermatitis	49.3 (236)	50.7 (243)
Contact Dermatitis	58.3 (442)	41.7 (316)
Food Allergy	63.8 (899)	36.2 (509)

Table 5 Prevalence of Allergic Diseases by Race

Allergic Disease	Race	Prevalence %	n
Allergic Rhinitis	White	89.1	7629
	Black or African American	1.5	129
	Native Hawaiian or Other Pacific Islander	0.1	9
	Asian	1.3	107
	American Indian or Alaska Native	0.2	15
	Other Race	7.0	598
	Unknown	0.8	68
Asthma	White	85.3	7153
	Black or African American	1.9	157
	Native Hawaiian or Other Pacific Islander	0.1	11
	Asian	1.1	96
	American Indian or Alaska Native	0.2	24
	Other Race	10.3	860
	Unknown	1.1	89
Atopic Dermatitis	White	88.5	424
	Black or African American	2.5	12
	Native Hawaiian or Other Pacific Islander	0.2	1
	Asian	2.3	11
	American Indian or Alaska Native	0.6	3
	Other Race	4.6	22
	Unknown	1.3	6
Contact Dermatitis	White	88.7	672
	Black or African American	1.1	8
	Native Hawaiian or Other Pacific Islander	0.1	1
	Asian	1.3	10
	American Indian or Alaska Native	0.0	0
	Other Race	7.7	59
	Unknown	1.1	8
Food Allergy	White	88.2	1242
	Black or African American	2.4	34
	Native Hawaiian or Other Pacific Islander	0.0	1
	Asian	1.2	17
	American Indian or Alaska Native	0.2	3

(Continued)

Table 5 (Continued).

Allergic Disease	Race	Prevalence %	n
	Other Race	7.6	106
	Unknown	0.4	5

Table 6 Prevalence of Allergic Diseases by Ethnicity (%), n)

Allergic Disease	Non-Hispanic/Latino	Hispanic/Latino	Unknown
Allergic Rhinitis	92.8 (7939)	5.4 (459)	1.8 (157)
Asthma	89.1 (7479)	8.1 (676)	2.8 (235)
Atopic Dermatitis	93.7 (449)	3.6 (17)	2.7 (13)
Contact Dermatitis	92.7 (703)	5.5 (42)	1.8 (13)
Food Allergy	93.3 (1313)	5.8 (81)	0.9 (14)

Discussion

This study provides important insights into the prevalence of allergic diseases and associated comorbidities in our cohort of an elderly population. Overall, 51.2% of the patients in the study had AR and 50.3% had asthma. Hypertension and coronary artery disease were the most frequent comorbidities. Our prevalence rates align with recent studies reporting similarly high frequencies of rhinitis and asthma among older adults in both European and Asian populations.^{4,5,7,9} This consistency supports the notion that allergic airway diseases remain clinically relevant in older adults worldwide, despite common assumptions of a decline with aging.

Atopic dermatitis and contact dermatitis were less common in our cohort, which mirrors prior findings demonstrating declining rates of these conditions with advanced age.^{10,11} However, recent work highlights that when present, dermatitis in older adults can present atypically and may be easily misdiagnosed, reinforcing the importance of a thorough assessment.^{10,11}

Our observation that patients aged 65–75 had higher rates of allergic diseases compared to those older than 75 suggests that either allergic diseases decline with advanced age or that diagnostic challenges and immunosenescence contribute to underdiagnosis in the very elderly. Immunosenescence and the phenomenon of “inflamm-aging” can lead to altered immune responses, reducing skin test reactivity and allergic sensitization.^{3,10,11} Diagnostic tests such as skin prick tests commonly show lower reactivity in elderly patients, further complicating identification of allergic conditions.^{2,3}

Gender differences in allergic prevalence were also noted. Female patients had higher rates in all allergic categories compared to men, consistent with prior reports suggesting estrogen may exacerbate allergic inflammation by increasing mucosal and skin permeability, while testosterone can suppress atopic responses.⁴ Understanding specific asthma phenotypes in elderly patients is crucial for targeted therapies and improved outcomes.¹²

The global burden of atopic dermatitis (AD) in elderly populations is substantial and projected to rise as populations age. Li et al report significant regional variation and a higher disease burden among elderly women. Despite slight declines in rates from 1990 to 2021, total AD cases and DALYs continue to increase, with projections exceeding 4 million cases in the 60–64 age group by 2045. These findings highlight the need for improved diagnosis, tailored management, and efforts to address health disparities in older adults with AD.¹³ Future studies should further investigate how aging-related immune dysfunction, medication use, and comorbidities interact with allergic diseases to improve outcomes in this vulnerable population.

Conclusions

This study emphasizes the high prevalence of allergic diseases in elderly patients, along with associated comorbidities that complicate diagnosis and treatment. There is a need for personalized diagnostic and management strategies that should be taken into consideration for this population.⁹ Future studies should focus on the impact of age-related immune degradation, the effects of medications, and examine how cardiovascular comorbidities affect allergic diseases.

Abbreviations

AR, allergic rhinitis; AD, atopic dermatitis; CD, contact dermatitis; HTN, hypertension; CAD, coronary artery disease; AFib, atrial fibrillation; MI, myocardial infarction; DM, diabetes mellitus.

Data Sharing Statement

Unable to share as there is PHI from the electronic medical record.

Ethics Approval

The IRB at Eisenhower Medical Center has approved the use of PHI in the EMR based on our protocol and meets the appropriate ethical standards. The request for Waiver of Consent was approved for this study. The IRB at Eisenhower Medical Center determined that a Waiver of Consent was justified in accordance with 45 CFR 16.116 (f) due to the research involving no more than minimal risk to subjects, the waiver not adversely affecting subjects' rights and welfare, and the research not being practicably carried out without the waiver. This study complies with the principles outlined in the Declaration of Helsinki.

Funding

There is no funding to report.

Disclosure

The authors report no conflicts of interest in this work.

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