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Atrial Fibrillation Doesn't Come Alone: The Geriatric Syndromes Behind the Arrhythmia

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Abstract

Objective: Atrial fibrillation (AF) is a frequent arrhythmia in older adults; geriatric syndromes, which are prevalent in this population, may influence AF outcomes. This study aimed to uncover the independent associations between AF and key geriatric syndromes in a real-world outpatient population.

Materials and Methods: This retrospective cross-sectional study examined patients aged 65 years or older who underwent comprehensive geriatric assessment at a tertiary-care outpatient clinic between 2012 and 2024. Univariate and multivariate analyses were performed to examine the associations between AF and geriatric syndromes.

Results: In 1251 patients the mean age was 75.7 ± 6.8 years, and 68.5% were female. AF prevalence was 11.5% (n = 145). Patients with AF (those whohad a current diagnosis of AF or in whom AF was newly detected during routine annual ECG screening) were older (mean age 77.9 ± 7.4 years) andwere predominantly female (73.1%). AF was significantly more prevalent in patients with frailty ($p < 0.001$), polypharmacy (defined as ≥5 drugs;$p < 0.001$), and constipation ($p = 0.039$). In multivariate analysis, advanced age [odds ratio (OR): 1.041, 95% confidence interval (CI): 1.011–1.072; $p = 0.007$], frailty (OR: 2.029, 95% CI: 1.337–3.080; $p < 0.001$), and polypharmacy (OR: 2.961, 95% CI: 1.789–4.900; $p < 0.001$) were independently associated with AF.

Conclusion: AF in older adults is not an isolated cardiac event but an indicator of broader geriatric vulnerability. Our findings indicate important associations between frailty, polypharmacy, and AF. These results underscore the critical need to shift from rhythm-focused care to a holistic, geriatric-centered approach in managing older adults with AF.

Keywords: Geriatric syndromes, atrial fibrillation, disability, polypharmacy

Introduction

Atrial fibrillation (AF) is the predominant sustained cardiac arrhythmia in clinical practice, characterized by disorganized atrial electrical activity leading to an irregular ventricular response and the loss of effective atrial contraction. The frequency of AF increases significantly with age, affecting approximately 4.2% of individuals aged 60–70 years and 17% of individuals aged 80 years or older (1,2). Community- and hospital-based studies confirm a prevalence of >25% among the very old (3). A large retrospective cohort study found that nearly one-third (29.8%) of older adults had documented AF, highlighting its substantial burden in geriatric populations (4). Importantly, AF is associated with significant morbidity and mortality in older adults, including increased risk of ischemic stroke, heart failure, functional decline, and diminished quality of life (3,5).

The management of AF in older adults is particularly challenging due to the high prevalence of multimorbidity, polypharmacy, and a constellation of age-related vulnerabilities collectively known as geriatric syndromes. Geriatric syndromes are multifactorial clinical conditions not attributable to discrete diseases but resulting from cumulative deficits in multiple organ systems. Epidemiological studies reveal that over 90% of community-dwelling older adults have at least one geriatric syndrome, and approximately 70–75% have two or more concurrent geriatric

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syndromes (6,7). The burden of geriatric syndromes increases with age and is strongly linked to negative consequences such as hospitalization, institutionalization, poor quality of life, and increased mortality (8,9).

Despite their clinical importance, few studies have investigated the relationship between geriatric syndromes and AF. Most contemporary guidelines address rhythm and rate control, anticoagulation, and risk stratification, but they do not adequately address how geriatric syndromes may impact clinical presentation, treatment decisions, and outcomes.

It is essential to determine the prevalence of AF and of the geriatric syndromes independently associated with AF among older adults to raise AF awareness and promote a more comprehensive AF management approach. Notably, this aligns with the recent shift emphasized by geriatric guidelines from a disease-based to a patient-centered approach. In this context, the purpose of our study is to assess the prevalence of AF in the older population and to identify the conditions and geriatric syndromes associated with AF.

Materials and Methods

Study Population

The study population consisted of community-dwelling older adults aged ≥65 years who underwent a comprehensive geriatric assessment between January 2012 and December 2024. Exclusion criteria were as follows: (i) being under 65 years of age; (ii) refusing to participate; (iii) any condition that might impair valid communication or data collection (e.g., profound hearing loss, severe depression, or psychosis); (iv) severe edema, metal implants, or cardiac pacemakers that would interfere with BIA measurement; and (v) conditions such as osteoarthritis, peripheral arterial disease, or stroke that would interfere with HGS measurement. Patients with complete documentation regarding AF status and geriatric syndrome variables were included in the analysis. The diagnosis of AF was based on physician-confirmed documentation or electrocardiographic evidence recorded in patient files. Patients with missing key clinical variables or with uncertain rhythm status were excluded. Informed consent was obtained from all participants. The study was approved by the İstanbul Faculty of Medicine Clinical Research Ethics Committee (reference number: 3580336, decision number: 18, date: 05.09.2025).

Geriatric Syndromes

All participants were assessed using standard comprehensive geriatric assessment tools. The selection of geriatric syndromes for this study was guided by their clinical relevance and the presence of robust diagnostic criteria:

Basic and instrumental functional status were evaluated using the Katz Activities of Daily living (ADL) scale and the Lawton instrumental ADL (IADL) scale, respectively. For ADL, a score of 1 was assigned if the participant was able to perform it independently, and 0 if assistance was required or if the participant was totally unable to perform it, yielding a total score between 0 (complete dependence) and 6 (full independence) (10). For IADL, each item was scored 1 (independence) or 0 (dependence), producing a total score ranging from 0 (complete dependence) to 8 (full independence) (11). Participants' ADL and IADL scores were evaluated separately; failure to obtain full scores on either assessment was interpreted as dependency.

The FRAIL scale is a simple 5-item questionnaire used to screen for frailty in older adults. It covers fatigue, resistance, ambulation, illness, and weight loss. Scores ≥3 were considered frail, scores of 1–2 were considered pre-frail, and scores of 0 were considered robust (12). In our study, patients with a score of 3 or higher were considered frail. Polypharmacy is defined as the regular use of five or more prescribed medications. (13).

The mini-mental state examination (MMSE) is a commonly employed cognitive screening instrument designed to evaluate cognitive status and identify potential impairments in older adults. It assesses orientation, attention, memory, language, and visuospatial skills and has a maximum possible score of 30. A score of 24 is interpreted as "cognitive impairment" (14).

The geriatric depression scale (GDS-30) is a 30-item self-report assessment tool developed to screen older adults as part of preventive measures. Questions are answered with "Yes" or "No", and 20 of the 30 questions examine depressive feelings; each depressive response is assigned 1 point. The total score ranges from 0 to 30. Patients scoring 14 or higher were included in the study (15,16).

Sarcopenia is characterized by the presence of both reduced skeletal muscle mass index (SMMI) and diminished handgrip strength (HGS). HGS was measured with a Jamar hydraulic dynamometer following a standardized protocol: participants were seated with the elbow flexed to 90° and the wrist in a neutral position. Each participant completed three maximal efforts with each hand, and the measurements were averaged. Cut-off values for HGS were taken from a study conducted by Bahat et al. (17) (32 kg for men and 22 kg for women). BIA assessments were performed using the Tanita BC-532. Measurements were taken with the patients fasting, with their bladders emptied, and with no metal objects (e.g., earrings, rings, watches, belts) on their bodies; patients were in the supine position with their extremities not touching the body. Fat-free mass (FFM) in the patients was assessed using the bioelectrical impedance analysis (BIA). Skeletal muscle mass (SMM) was calculated using the formula FFM × 0.566. The equation SMM (kg)=0.566×FFM was validated using both individual and group data obtained from

a cohort of healthy subjects (18). SMMI was calculated using the formula: SMMI (%) = [SMM (kg)/body mass (kg)] × 100 (19). Cut-off values for SMMI were also taken from a study conducted by Bahat et al. (20) (%37.4 for men and %33.6 for women).

The mini nutritional assessment–short form (MNA-SF) is a validated 6-item screening tool designed to identify malnutrition or the risk of malnutrition in older adults. Standard cut-offs were applied: 12–14 normal, 8–11 at risk, and 0–7 malnourished. In this study, patients with scores of 7 or less were evaluated (21).

Patients were considered to have urinary incontinence if they reported involuntary urine loss that occurred at least once weekly, persisted over time, and affected their daily functioning or well-being (22).

Patients with involuntary loss of solid or liquid stool or gas, occurring more than once per week and causing functional or psychological impairment, were considered to have fecal incontinence (23). For study eligibility, constipation was defined according to the Rome IV criteria (24).

Statistical Analysis

Descriptive statistics were applied to characterize the study population. Continuous variables were presented as mean ± standard deviation or as median with interquartile range according to their distribution, whereas categorical variables were reported as frequencies and percentages.

Comparisons of categorical variables between patients with and without AF were performed using the Pearson chi-square ($\chi 2$) test to determine whether AF was significantly associated with each geriatric syndrome.

Variables that were significant in the univariate analysis were subsequently entered into a binary logistic regression model to identify independent predictors of AF. Multicollinearity among the potential confounders was assessed before their inclusion in the same model. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. For all analyses, a p-value of <0.05 was considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 2,320 older adults who underwent comprehensive geriatric assessment between January 2012 and December 2024 were screened for study eligibility. After excluding cases with missing or incomplete data, 1,251 patients were included in the final analysis. Of these participants, 857 (68.5%) were female and 394 (31.5%) were male. The overall prevalence of AF in the study population was 11.5% (n = 145). Among individuals with AF, the mean age was 77.9 ± 7.4 years, and 106 patients (73.1%) were predominantly female. Other demographic data for the patients are presented in Table 1.

Descriptive statistics of geriatric syndromes showed that, among 1,251 participants with complete data the prevalence of frailty (38.9% vs. 18.8%; p < 0.0001), polypharmacy (84.7% vs. 61.4%; p < 0.0001), ADL (37.2% vs. 26.7%; p = 0.0076), and IADL (51.7% vs. 35.2%; p = 0.0001) in the group with AF were higher than in patients without AF. All detailed counts, percentages, and p-values for these variables are provided in Table 2.

Bivariate analyses using Pearson's chi-square test identified the following geriatric syndromes as significantly associated with AF: frailty (p < 0.001), polypharmacy (p < 0.001), disability (p = 0.001) and constipation (p = 0.039). Other chi-square analyses and p-values are shown in Table 3. A binary logistic regression was conducted to identify the independent predictors of AF, with age, female sex, frailty, polypharmacy, and constipation included as covariates. The regression model showed that age, polypharmacy, and frailty were significantly associated with AF (p = 0.007, p < 0.001, and p < 0.001). Neither female sex nor constipation was not significantly associated with AF (p = 0.504 and p = 0.408). P-values and other statistical data for all parameters are presented in Table 4.

Discussion

Table 1. Demographics of patient with and without atrial fibrillation.

Overall	Without AF	With AF
Total, n = 1251	1106	145
Age	75.4 ± 6.8	77.9 ± 7.4
Sex		
Women	67.9%	73.1%
Men	32.1%	26.9%
Marital status		
Married	54.6%	48.6%
Widow	40.1%	49.3%
Single	2.7%	%0.7%
Number of chronic diseases	3.7 ± 1.9	5.0 ± 1.9
Number of medications used	5.9 ± 3.4	7.4 ± 3.0
DM	33.2%	34.5%
MI	1%	2.8%
HT	71.7%	80.0%
CAD	19.5%	29.7%
CHF	4.5%	23.4%
CKD	5.3%	9.0%
COPD	5.3%	10.3%

n: number, AF: Atrial fibrillation, DM: Diabetes mellitus, MI: Myocardial infarction, HT: Hypertension, CAD: Coronary artery Disease, CHF: Congestive heart failure, CKD: Chronic kidney disease, COPD: Chronic obstructive pulmonary disease.

AF represents the most frequent sustained cardiac arrhythmia among older adults, with prevalence increasing significantly with age. Additionally, AF contributes substantially to morbidity and mortality through thromboembolic events, heart failure, and functional decline (25). In parallel, geriatric syndromes are increasingly recognized as predictors of adverse outcomes in older adults, including hospitalization, institutionalization, and death (8,9). However, few studies have addressed the prevalence of these geriatric syndromes in older adults and their association with AF.

Table 2. Frequency of geriatric syndromes in the study population.

Geriatric syndrome AF	With AF	Without AF
ADL	37.2%	26.7%
IADL	51.7%	35.2%
Frailty	38.9%	18.8%
Polypharmacy	84.7%	61.4%
Sarcopenia	45.9%	48.0%
Depression	40.0%	31.7%
Cognitive impairment	22.7%	17.9%
Malnutrition	1.4%	4.5%
Urinary incontinence	50.3%	42.2%
Fecal incontinence	8.3%	5.2%
Constipation	38.6%	30.2%

AF: Atrial fibrillation, ADL: Activities of daily living, IADL: Instrumental activities of daily living.

Table 3. Univariate logistic regression analyses regarding the factors associated with AF.

Geriatric syndrome p-value	OR	95% CI
Frailty <0.001	2.76	1.91–3.98
ADL 0.007	1.63	1.14–2.34
IADL <0.001	1.97	1.39–2.80
Polypharmacy <0.001	3.48	2.17–5.57
Constipation 0.039	1.45	1.02–2.08
Depression 0.09	1.44	0.94–2.18
Cognitive impairment 0.242	1.31	0.83–2.06
Malnutrition 0.074	0.29	0.07–1.22
Urinary incontinence 0.068	1.38	0.98–1.95
Fecal incontinence 0.136	1.63	0.85–3.11
Sarcopenia 0.931	0.92	0.64–1.32

n: number, ADL: Activities of daily living, IADL: Instrumental activities of daily living, OR: Odds ratio, CI: Confidence interval, AF: Atrial fibrillation.

In our analysis, frailty was independently associated with AF. This is consistent with multiple studies demonstrating that frailty is a key correlate of AF in older populations. Similarly, Shah et al. (26) performed a national cross-sectional analysis in the United States using Medicare data and found that frailty was present in 38% of patients with AF, significantly higher than among those without AF. They showed that each additional syndrome was associated with decreased anticoagulant use. However, that work did not test the AF–frailty association but rather examined how the syndrome burden modifies treatment patterns in an AF population. Our data complement these findings by demonstrating that in a real-world geriatric referral sample with substantial multimorbidity and high medication burden, frailty co-occurs with AF. This observation is clinically consistent with Shah et al.'s (26) emphasis on the complex intersection between geriatric syndromes and AF management. Differences in study population (community-dwelling, survey-weighted vs. specialty clinic), outcome focus (treatment use vs. AF–frailty link), and case selection likely explain the divergent emphases. In the Framingham Heart Study, Orkaby et al. (27) conducted a prospective analysis of 1,163 community-dwelling older adults and found no significant association between baseline frailty and incident AF over approximately 9.2 years, nor any link between prevalent AF and subsequent frailty. Their patients were younger and healthier on average (mean age approximately 70 years; lower multimorbidity) than our sample (mean age approximately 78 years; higher multimorbidity). Frailty was defined using the Fried phenotype, whereas we used the FRAIL score. The study designs also differed: Framingham used a longitudinal, incidence-based design with competing-risk modeling, whereas our analysis used a cross-sectional, prevalence-based design. Finally, community sampling may introduce survivor or selection effects, while a tertiary geriatric clinic concentrates patients with accumulated deficits, polypharmacy, and functional loss. Together, these factors tend to dilute frailty–AF associations in Framingham but amplify them in our setting. In another study, Shim et al. (28) examined cross-sectional and longitudinal data from a cohort of more than 4,000 older Japanese adults and reported that reduced gait speed and grip strength were associated with both prevalent and incident AF. In contrast, Koca et al. (5) observed higher, although non-significant, frequencies of frailty in AF compared to sinus rhythm when using the Fried and FRAIL scales; FRAIL scores were positively correlated with AF symptom severity. This pattern is reflected in our data. Although categorical frailty may not always distinguish between groups, AF tends to be concentrated among individuals with functional frailty. These findings underscore frailty as both a risk marker

Table 4. Multivariate logistic regression analyses regarding factors independently associated with AF.

Variable	p-value	Odds ratio	95% CI lower	95% CI upper
Frailty	0.001	2.029	1.337	3.08
Polypharmacy	<0.001	2.961	1.789	4.9
Constipation	0.408	1.173	0.804	1.712
Female sex	0.504	1.151	0.762	1.738
Age	0.007	1.041	1.011	1.072

CI: Confidence interval, AF: Atrial fibrillation.

and a potential consequence of AF-associated deconditioning.

Polypharmacy (≥5 medications) was highly prevalent in our cohort and independently associated with AF. In a retrospective study of approximately 340,000 patients over the age of 75, conducted by Chen et al. (29), the prevalence of polypharmacy was found to be high in patients with AF, similar to our study. They showed that patient with ≥5 drugs at diagnosis and polypharmacy predicted more major bleeding and heart-failure hospitalization. We examined the co-occurrence of AF and polypharmacy in a CGA context, whereas Chen et al. (29) examined prognosis and treatment response after AF using claims-based exposure windows. Taken together, both perspectives argue for medication review and consideration of polypharmacy to improve safety in older adults with AF. These findings suggest that polypharmacy may not only be a marker of comorbidity but also a contributor to AF progression or complications.

Our study found that disability was significantly associated with AF. The prevalence of AF was greater among participants with disabilities than among those without, reinforcing the notion that AF is linked to functional decline in later life. Our findings are consistent with previous studies assessing functional status in older adults with AF. Wallace et al. (30) showed that incident AF shortened disability-free survival and increased the risk of subsequent ADL disability, even after accounting for interim stroke and heart failure. In our study, we observed a higher prevalence of disability and a stronger cross-sectional association, particularly for IADL. This difference is plausibly explained by case mix: our AF group has greater multimorbidity and polypharmacy, which likely depresses instrumental function first. Wallace et al. (30) provide longitudinal evidence that AF independently accelerates ADL disability; our data extend this gradient into IADL. This supports the clinical imperative to integrate decisions regarding rhythm and rate control and anticoagulation into function-focused, multimorbidity-aware care plans. Parks et al.'s (31) cohort analysis of approximately 3,500 patients found that new-onset AF was associated with an accelerated annual decline in ADL independence and walking speed, even after multivariable adjustment. In a longitudinal analysis of the ILSA study by Noale et al. (32) they followed patients for over eight years and showed that, during follow-up, baseline cardiac arrhythmia was significantly associated with an increased risk of developing ADL disability. They used a time-to-event model for any new ADL, whereas we used a full-independence-only approach. While they pooled arrhythmias, we studied only patients with AF. Their study supports arrhythmia as a longitudinal driver of ADL disability, while our data extend the functional burden to IADL, suggesting that function-oriented management is warranted. In a cross-sectional study conducted by Koca et al. (5) 123 patients were examined: 64 had AF and 56 were in sinus rhythm. In this study, patients with AF had significantly lower IADL scores. Our study demonstrated a higher disability burden in both domains, with a stronger signal for IADL dependence. In Koca et al. (5) patients with AF were older than controls, exhibited greater multimorbidity, and had a markedly higher prevalence of coronary artery disease and heart failure. Similarly, in our study, AF patients were even older on average and—relative to our non-AF group—had more chronic diseases and used more medications; coronary artery disease and congestive heart failure were also more frequent among AF patients. Thus, Koca et al. (5) map an "instrumental-first" disability phenotype in AF, and our data extend this by showing a higher absolute prevalence in both ADL and IADL among an older, polypharmacy-laden clinic population. These findings highlight the need to incorporate function-focused goals (especially IADL support) into AF management from the outset. In another cohort study conducted by Piacenza et al. (33) with approximately 3,400 patients, cluster analysis was performed on two large disease groups. They showed that functional dependence is strongly associated with AF.

Study Limitations

One of the limiting factors of our study is its retrospective nature. Furthermore, because patients presented to a tertiary healthcare facility, they had more comorbidities and more complex conditions. This makes it difficult for the study population to be representative of the general population.

Conclusion

Our study adds to the growing evidence that geriatric syndromes, particularly frailty, polypharmacy, and disability, are closely associated with AF in older adults. Incorporating comprehensive geriatric assessment into the routine clinical management of AF

may enhance risk stratification, improve therapeutic decision-making, and ultimately optimize outcomes. Future longitudinal studies are needed to better characterize the causal pathways linking specific geriatric syndromes to AF incidence, progression, and prognosis.

Ethics

Ethics Committee Approval: The study was approved by the İstanbul Faculty of Medicine Clinical Research Ethics Committee (reference number: 3580336, decision number: 18, date: 05.09.2025).

Informed Consent: Informed consent was obtained from all participants.

Footnotes

Authorship Contributions

Surgical and Medical Practices: C.K., H.Ö., Concept: S.Ö., G.B., M.A.K., Design: T.E., M.A.K., Analysis or Interpretation: H.A., D.S., N.H.Ö., Literature Search: H.A., D.S., Writing: H.A., S.Ö.

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