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Gender-Specific Impact of Cataracts on Geriatric Syndrome Burden in Solitary-Living Older Adults

Yalnız Yaşayan Yaşlı Yetişkinlerde Kataraktın Geriatrik Sendrom Yükü Üzerindeki Cinsiyete Özgü Etkisi

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Abstract: Older adults living alone are at increased risk for geriatric syndromes, and visual impairment from cataract may further exacerbate this vulnerability. However, data on the relationship between cataracts and geriatric syndrome burden in this population remain limited. We planned to investigate the relationship between cataracts and geriatric syndromes burden among older adults who live alone. This retrospective, cross-sectional study included community-dwelling older adults who lived alone and underwent comprehensive geriatric assessment at the Geriatrics Outpatient Clinic of Balıkesir Atatürk City Hospital between January 2022 and December 2024. Cataract status was confirmed by ophthalmology records. Geriatric syndromes assessed included cognitive impairment, depressive symptoms, malnutrition, frailty, and history of falls. The geriatric syndrome burden was defined as the presence of at least two impairments in the main domains of comprehensive geriatric assessment. Multivariate logistic regression adjusted for age, sex, education, polypharmacy, BMI, and comorbidity count. A total of 299 participants (mean age 77.0 ± 7.3 years, 63% female) were included; 139 (46.5%) had cataracts. Compared with those without cataracts, affected individuals were older (78.68 ± 6.90 vs. 75.57 ± 7.46 years, p = 0.02), had lower education (5.17 ± 3.43 vs. 5.98 ± 3.65 years, p = 0.02), and higher polypharmacy rates (67% vs. 53%, p = 0.01). Cognitive impairment prevalence was greater in the cataract group (67% vs. 56%, p = 0.03). In women, cataracts were associated with higher geriatric syndrome burden (OR 2.30, 95% CI 1.04–5.12, p = 0.04); no significant association was observed in men (OR 0.91, 95% CI 0.54–1.55, p = 0.74). Cataracts are linked to greater cognitive impairment and, in women, a higher geriatric syndrome burden among older adults living alone. Incorporating vision assessment into geriatric evaluations may help identify vulnerable individuals and inform targeted interventions.

Keywords: Cataract, geriatric syndromes, malnutrition, cognitive impairment, polypharmacy, living alone, older adults

Özet: Yalnız yaşayan yaşlılar, geriatrik sendromlara yakalanma riski daha yüksektir ve katarakt kaynaklı görme bozukluğu bu riski daha da artırabilir. Ancak, bu popülasyonda katarakt ve geriatrik sendrom yükü arasındaki ilişkiye dair veriler sınırlıdır. Yalnız yaşayan yaşlılarda katarakt ve geriatrik sendrom yükü arasındaki ilişkiyi araştırmayı planladık. Bu retrospektif, kesitsel çalışma, Ocak 2022 ile Aralık 2024 tarihleri arasında Balıkesir Atatürk Şehir Hastanesi Geriatri Polikliniği'nde kapsamlı geriatrik değerlendirmeye tabi tutulan, yalnız yaşayan ve 65 yaş ve üzeri toplumda yaşayan yetişkinleri içermektedir. Katarakt durumu oftalmoloji kayıtları ile doğrulandı. Değerlendirilen geriatrik sendromlar arasında bilişsel bozukluk, depresif belirtiler, malnütrisyon, kırılganlık ve düşme öyküsü yer aldı. Geriatrik sendrom yükü, kapsamlı geriatrik değerlendirmenin ana alanlarından en az iki alanda bozulma olarak tanımlanmıştır. Çok değişkenli lojistik regresyon, yaş, cinsiyet, eğitim, polifarmasi, BMI ve komorbidite sayısı için düzeltildi. Toplam 299 katılımcı (ortalama yaş 77.0 ± 7.3 yıl, %63 kadın) çalışmaya dahil edildi; 139'unda (%46.5) katarakt vardı. Kataraktı olmayanlarla karşılaştırıldığında, etkilenen bireyler daha yaşlı (78.68 ± 6.90 vs. 75.57 ± 7.46 yıl, p = 0.02), daha düşük eğitimli (5.17 ± 3.43 vs. 5.98 ± 3.65 yıl, p = 0.02) ve daha yüksek polifarmasi oranlarına sahipti (%67 vs. %53, p = 0.01). Bilişsel bozukluk prevalansı katarakt grubunda daha yüksekti (%67'ye karşı %56, p = 0.03). Kadınlarda katarakt daha yüksek geriatrik sendrom yükü ile ilişkiliyken (OR 2.30, %95 CI 1.04-5.12, p = 0.04); erkeklerde anlamlı bir ilişki gözlenmemiştir (OR 0.91, %95 CI 0.54-1.55, p = 0.74). Katarakt, yalnız yaşayan yaşlı yetişkinler arasında daha fazla bilişsel bozulma ve kadınlarda daha yüksek geriatrik sendrom yükü ile bağlantılıdır. Görme değerlendirmesinin geriatrik değerlendirmelere dahil edilmesi, hassas bireylerin belirlenmesine ve hedeflenen müdahalelerin bilgilendirilmesine yardımcı olabilir.

Anahtar Kelimeler: Katarakt, geriatrik sendromlar, malnütrisyon, bilişsel bozukluk, polifarmasi, yalnız yaşamak, yaşlı yetişkinler

Ethics Committee Approval: The study was approved by the Balıkesir Ataturk City Hospital Clinical Research Ethics Committee (Decision No: 2025/08/84, Date: 21.08.2025).

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1. Introduction

The global demographic trend toward population aging has led to a substantial increase in the proportion of older adults, with projections indicating a continuous rise in the coming decades (1). Within this expanding demographic, a significant subset comprises older adults who live alone (2). The phenomenon of solitary living in late life has been consistently associated with an elevated vulnerability to a spectrum of adverse health outcomes, including—but not limited to—functional decline, cognitive impairment, depressive symptoms, malnutrition, and an increased risk of falls (3). These risks are further compounded by social isolation and restricted access to informal care networks, which may exacerbate underlying medical and geriatric conditions (4,5).

Geriatric syndromes including frailty, cognitive impairment, depression, polypharmacy, falls, and malnutrition are multifactorial and often co-occur, significantly impacting morbidity, quality of life, and healthcare utilization in the aging population (6). Visual impairment, particularly from age-related cataracts, is a common sensory deficit and a leading cause of visual impairment worldwide (7). Literature indicates that visual impairment not only contributes to frailty and cognitive decline but also exacerbates depressive symptoms and social disengagement (8).

Despite the well-established associations between cataracts and several geriatric syndromes, including frailty, falls, and cognitive impairment, there is a notable lack of empirical data specifically examining its relationship with malnutrition (9, 10, 11). This gap is particularly relevant, as malnutrition frequently coexists with frailty and functional decline, and visual impairment may exacerbate nutritional deficits (12). Moreover, the correlation between cataracts and various geriatric syndromes has been examined in general older populations, studies focusing specifically on older adults who live alone are exceedingly scarce (13). Additionally, there are very few observational studies that reflect real-world clinical practices in this area. To address this gap, the present study aims to examine the relationship between cataracts and geriatric syndromes burden (GSB) including malnutrition among older adults who live alone. We hypothesize that visual impairment from cataracts may exacerbate the risk of malnutrition and other geriatric syndromes in this vulnerable subgroup.

2. Materyal and Methods

Study Design and Population

This retrospective, cross-sectional study was conducted at the Geriatrics Outpatient Clinic and YASAM of Balıkesir Atatürk City Hospital (6, 14). Medical records of community-dwelling older adults who were living alone and evaluated between January 1, 2022, and December 31, 2024, were reviewed. Individuals were included if their medical records clearly indicated that they lived alone (e.g., “no caregiver,” “lives alone,” “no family support”) and if a comprehensive geriatric assessment had been documented. This study was approved by the Institutional Review Board of the tertiary hospital (Approval No: 2025/08/84; Date: 21.08.2025). Informed consent was waived due to the use of anonymized retrospective data, in accordance with the Declaration of Helsinki.

Inclusion and Exclusion Criteria

Inclusion criteria were:

- Age ≥65 years
- Living alone (as explicitly stated in clinical notes)
- Availability of complete data from standardized geriatric assessment tools

Exclusion criteria included:

- Severe visual impairment due to non-cataract causes (e.g., macular degeneration, glaucoma)
- Ophthalmic surgery
- Institutionalization or cohabitation with others
- Incomplete or missing geriatric assessment data

Cataract Status

The status of cataracts was defined as documented by ophthalmology specialists during routine clinical evaluations using the International Classification of Diseases (ICD) code (H25-H25.1-H25.8-H25.9-H26-H26.8-H26.9) (15, 16). The patient information was obtained from the SISOFT electronic hospital registration database (17).

Study Outcomes

Comprehensive Geriatric assessment

Geriatric syndromes were systematically evaluated using standardized and validated tools recorded during the initial comprehensive geriatric assessment. Cognitive impairment was assessed with the Mini-Mental State Examination (MMSE), and scores below 24, adjusted for education level, were considered indicative of impairment. Depressive symptoms were identified using the 15-item Geriatric Depression Scale–Short Form (GDS-15), with scores ≥5 suggesting clinically relevant depressive symptoms. Nutritional status was evaluated using the Mini Nutritional Assessment–Short Form (MNA-SF), with scores of 8–11 interpreted as at risk of malnutrition and ≤7 as indicative of malnutrition. Physical frailty was determined using the FRAIL scale, in which scores of 3 or more signified frailty (18). Probable sarcopenia was defined as a documentation of low muscle strength in accordance with the revised criteria of the European Working Group on Sarcopenia in Older People (EWGSOP2) (17, 19, 20). A history of falls was defined as having at least one documented fall in the previous 12 months. Geriatric syndrome burden (GSB) is defined as the presence of at least two impairments in the main domains of comprehensive geriatric assessment, including nutrition, cognitive function, psychological health, and locomotor capacity. These domains are also emphasized in the Integrated Care for Older People (ICOPE) framework proposed by the World Health Organization (WHO) (21). A higher burden score reflected a more complex and vulnerable clinical profile (6).

Covariates

Covariates included in the analysis were age, sex, educational attainment, number of chronic diseases, polypharmacy (defined as the concurrent use of five or more medications), and body mass index (BMI). These variables were extracted from medical records and were included in multivariate models as potential confounders due to their established associations with both visual impairment and geriatric syndromes.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as means ± standard deviations or medians with interquartile ranges, depending on data distribution assessed by the Shapiro–Wilk test. Categorical variables were presented as frequencies and percentages. Comparisons between participants with and without cataract were conducted using the independent-samples t-test or the Mann–Whitney U test for continuous variables, and the chi-square test for categorical variables. Multivariate logistic regression analyses were performed to determine the independent associations between cataract presence and each geriatric syndrome as well as total GSB. Covariates included age, sex, educational status, polypharmacy, BMI, and number of chronic diseases. Adjusted odds ratios (aORs) with 95% confidence intervals (CIs) were reported. A p-value of <0.05 was considered statistically significant.

3. Results

The mean age of individuals diagnosed with cataracts was found to be significantly higher at 78.68 years (± 6.90) compared to those without cataracts, with a p-value of 0.02. Additionally, the average years of education in the cataract group was lower at 5.17 years (± 3.43) compared to 5.98 years (± 3.65) in the non-cataract group, which was also statistically significant (p = 0.02). Following a comprehensive evaluation of the entire study population, the malnutrition rate was found to be 6.7%. Additionally, the prevalence of sarcopenia was noted at 49.8%, while the rates of depression and cognitive impairment were 28.3% and 40.5%, respectively. Moreover, the average comorbidity burden was estimated to be approximately 2.8 diseases.

In the cataract group, the rate of polypharmacy (use of ≥5 medications) was determined to be 67%, while this rate was 53% in the non-cataract group, and this difference was found to be significant (p = 0.01). The prevalence of cognitive impairment was 67% in the cataract group, while the non-cataract group exhibited a lower rate of 56%, and this difference was also found to be significant (p = 0.03). No significant difference was observed between the two groups in other clinical parameters such as malnutrition, fall risk, and depression (p > 0.05) (Table 1).

Association Between Cataract and Geriatric Syndrome Burden

A subgroup analysis was conducted to explore the link between cataracts and geriatric syndrome, revealing variability according to gender. In women, cataracts were significantly associated with a higher burden of geriatric syndrome, showing an odds ratio (OR) of 2.30 (95% CI: 1.04 - 5.12, p = 0.04). In contrast, in the male population, the impact of cataracts on geriatric syndrome was not statistically

significant, with an odds ratio (OR) of 0.91 (95% CI: 0.54 - 1.55, p = 0.74) (Table 2).

Table 1. Comparison of Demographic, Clinical, and Geriatric Syndrome Burden Between Cataract and Non-Cataract Groups

Variable	No Cataract (%)	Cataract (%)	p-value
Number of patients	**220**	**239**	
Age (mean ± SD)	77.01 ± 7.65	78.68 ± 6.90	0.02
Years of education (mean ± SD)	5.98 ± 3.65	5.17 ± 3.43	0.02
Polypharmacy (≥5 drugs)	53.0	67.0	0.01
Malnutrition (MNA ≤7)	6.0	7.0	0.85
Fall risk (TUG ≥12 sec)	70.0	72.0	0.76
Cognitive impairment (MMSE≤24)	56.0	67.0	0.03
Depression (YGDS ≥5)	26.0	31.0	0.30
Sarcopenia (probable)	50.0	49.0	0.85
Barthel: Independent (=100)	86.0	86.0	0.49
Lawton: Independent (=8)	13.0	15.0	0.11
Diabetes mellitus	35.0	42.0	0.10
Hypertension	74.0	72.0	0.75
COPD	4.0	5.0	0.52
Osteoporosis	17.0	24.0	0.07
Stroke	4.0	3.0	0.44
Frailty: Robust	21.4	17.2	0.29
Frailty: Pre-frail	37.7	44.4	0.29
Frailty: Frail	40.9	38.5	0.29
Geriatric Syndrome Burden	2.20	2.15	0.65

Abbreviations: Barthel: Barthel Index of Activities of Daily Living; COPD: Chronic Obstructive Pulmonary Disease; Lawton: Lawton Instrumental Activities of Daily Living Scale; MMSE: Mini-Mental State Examination; MNA: Mini Nutritional Assessment; SD:Standard Deviation; TUG: Timed Up and Go Test; YGDS: Yesavage Geriatric Depression Scale.

Table 2. Association Between Cataract and Geriatric Syndrome Burden (Binary Outcome)

Sex	Variable	OR	95% CI	p-value
Women	**Cataract***	2.30	1.04 – 5.12	0.04
	Age	1.03	0.99 – 1.08	0.24
	Comorbidities	1.12	0.98 – 1.28	0.09
Men	**Cataract***	0.91	0.54 – 1.55	0.74
	Age	1.02	0.99 – 1.06	0.21
	Comorbidities	1.08	0.89 – 1.30	0.43

Adjusted for age and comorbidities

Abbreviations: CI: Confidence Interval; OD: odds ratio.

4. Discussion

In this study, individuals with cataracts were found to be older, have lower education levels, and be more prone to polypharmacy compared to those without cataracts. Additionally, the prevalence of cognitive impairment was significantly higher in the cataract group. In women, a significant association was found between the presence of cataracts and an increased GSB, even after adjustments for age and the number of comorbidities. A similar association was not found in men. These results suggest that cataracts, especially in older women, may be associated with the GSB and that visual impairment should be considered in comprehensive geriatric assessments.

Visual impairments significantly impact the functionality of older individuals, influencing not only mobility and independence but also social and psychological well-being (22). The World Health Organization (WHO) recommends that evaluations of older patients include assessments of both vision and hearing as part of evaluating their intrinsic capacity (23). This study must consider how cataracts contribute to the overall burden of geriatric syndromes, especially among female patients. The differences in health outcomes between genders may be due to older women being more prone to exhibit signs of frailty (24). Moreover, declines in sensory input, including vision loss, have been shown to significantly affect geriatric syndromes such as frailty, malnutrition, cognitive impairment, and mood disorders (25). While the expected outcomes are relevant for both sexes, the observed differences may arise from women's heightened sensitivity due to the loss of protective hormonal effects, like estrogen, after menopause (24). Furthermore, conducting prospective randomized controlled studies is essential to clarify these issues.

A comprehensive examination of geriatric syndromes could provide an effective approach to reducing the prevalence of overlap syndromes and confounding factors in older adults (6). Evaluating each syndrome separately, especially given the numerous confounding factors, makes it challenging to establish clear relationships among them. This difficulty is also evident in studies investigating the effects of medication burden (26, 27). Therefore, it is essential to assess the cumulative impact rather than focusing solely on the net effect of an independent variable. Conducting studies aimed at minimizing confounding factors could help clarify these issues.

The finding that cognitive impairment is more common among cataract patients with geriatric syndromes is consistent with existing literature (9, 28). Although other geriatric syndromes also showed an increased prevalence in patients with cataracts, these results did not reach statistical significance. This lack of significance may be due to the limited number of patients included in the study.

Additionally, polypharmacy, which is another notable geriatric syndrome, was more prevalent among cataract patients. Research has shown that medications can influence ophthalmic conditions, and anticholinergic burden has been previously linked to various eye diseases (29). While polypharmacy was not the primary focus of this study, investigating the relationship between polypharmacy and cataracts in future research is critical to understanding how medication burden exacerbates visual impairment and related geriatric syndromes (27).

The impact of diabetes mellitus on cataracts, particularly in the context of other comorbid conditions, has been well-documented (30, 31). This study found a higher prevalence of diabetes among patients with cataracts. However, the lack of a statistically significant difference between the two groups may be due to the small number of participants in the study. An important observation is the increased prevalence of osteoporosis among cataract patients, although this association only reached borderline significance. Further research in this area is essential to clarify the complexities of this relationship (32).

The study has several limitations. It was conducted at a single center, involved a small number of participants, and relied on verbal declarations for survival status. Additionally, because the study was designed retrospectively, there is a possibility that the file records may be incomplete or inaccurate. It is also important to consider that confounding factors could influence cataract outcomes. Unfortunately, due to the limited number of patients, geriatric syndromes could not be evaluated as a separate subgroup. Therefore, future prospective studies with a larger participant pool are needed. On the other hand, the strengths of the study include its focus on older individuals living alone and the fact that these individuals underwent a comprehensive geriatric evaluation.

Clinical implications and future directions

The findings of this study have important clinical implications. Early detection and management of cataracts in older adults, especially those living alone, could help mitigate the risk of developing GSB.

Further investigation is needed to explore the mechanisms through which cataracts contribute to frailty, cognitive decline, and malnutrition, with a particular focus on older women. Longitudinal studies are essential to better understand the causal relationships between cataracts and geriatric syndromes over time. Moreover, future research should investigate gender differences to inform the development of more tailored interventions for older adults.

Conclusion

In older adults living alone, cataracts were associated with cognitive impairment, polypharmacy, and especially in women an increased GSB. Notably, in women, cataracts were independently linked to a higher GSB, while no similar association was observed in men. These findings underscore the potential role of visual impairment, particularly cataracts, in heightening vulnerability among older women living alone. Systematic vision assessments should be integrated into comprehensive geriatric evaluations to enable early identification of at-risk individuals and guide targeted interventions.

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