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Urinary incontinence as a hidden driver of mental health, falls, and frailty in community-dwelling older adults

Toplumda yaşayan yaşlı bireylerde ruhsal sağlık, düşmeler ve kırılganlığın gizli nedeni olarak üriner inkontinans

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ABSTRACT

Aim: Urinary incontinence is common in older adults, significantly reducing quality of life and contributing to adverse health outcomes. This study evaluates the impact of urinary incontinence on prevalent geriatric syndromes and gender-specific differences.

Material and Methods: The study included 576 community-dwelling individuals aged ≥60 years without dementia, neurological diseases, or active infections. Data were obtained retrospectively from comprehensive geriatric assessments. Frailty was assessed using Fried criteria, depression via the Geriatric Depression Scale, with additional evaluations including daily activity levels, gait speed, falls history in last year, and insomnia complaints.

Results: Urinary incontinence was reported in 322 participants (55.91%). Mean age was 69.82±6.39 years. Urinary incontinence was significantly associated with female gender, obesity, frailty, reduced gait speed, depression, fall, insomnia, and diabetes (p<0.001, p=0.001, p<0.001, p<0.001, p<0.001, p<0.001, p<0.001 and p=0.019, respectively). Women with urinary incontinence had higher rates of obesity, depression, reduced gait speed, and frailty than men with urinary incontinence (p=0.013, p<0.001, p<0.001 and p<0.001, respectively). Multivariable regression analyses revealed that urinary incontinence increased the likelihood of depression (OR: 1.59; CI: 1.06–2.38; p=0.024), insomnia (OR: 2.12; CI: 1.39–3.18; p<0.001), falls (OR: 2.10; CI: 1.39–3.17; p<0.001), and frailty (OR: 2.42; CI: 1.66–3.54; p<0.001).

Conclusion: Urinary incontinence is highly prevalent among older adults, particularly women, and strongly linked to depression, insomnia, frailty, and falls. Women with urinary incontinence are more likely to experience depression and frailty compared to men, despite similar rates of insomnia and falls. Routine screening and management of urinary incontinence are critical to addressing its physical and psychological impacts.

Keywords: Urinary incontinence, depression, insomnia, fall, frailty

ÖZ

Amaç: Üriner inkontinans, yaşlı bireylerde sık görülen, yaşam kalitesini azaltan ve olumsuz sağlık sonuçlarıyla ilişkili bir semptomdur. Bu çalışma, üriner inkontinansın yaygın görülen geriatrik sendromlara etkisini ve cinsiyete özgü farklılıkları değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntemler: Çalışmaya, 60 yaş ve üzeri, demans, nörolojik hastalık veya aktif enfeksiyonu olmayan, toplumda yaşayan bireyler dahil edilmiştir. Veriler, ayaktan polikliniklerde yapılan kapsamlı geriatri değerlendirmelerinden elde edilmiştir. Kırılganlık Fried kriterleriyle, depresyon Geriatrik Depresyon Ölçeği ile değerlendirilmiş; günlük yaşam aktivite düzeyleri, yürüme hızı, düşme öyküsü ve insomnia şikayetleri incelenmiştir.

Bulgular: Çalışmaya katılan 576 bireyin 322'si (55.91) üriner inkontinans şikâyeti vardı. Kohortun ortalama yaşı 69.82±6.39du. Üriner inkontinanslı hastalarda kadın cinsiyet, obezite, kırılganlık, azalmış yürüme hızı, depresyon, düşme, insomnia ve diyabet oranları anlamlı derecede daha yüksekti (p<0.001, p=0.001, p<0.001, p<0.001, p<0.001, p<0.001, p<0.001 ve p=0.019). Üriner inkontinanslı kadınlar, üriner inkontinanslı erkeklere kıyasla daha fazla obezite, depresyon, azalmış yürüme hızı ve kırılganlık oranlarına sahipti (p=0.013, p<0.001, p<0.001 ve p<0.001). Çok değişkenli regresyon analizleri, üriner inkontinansın depresyon (OR: 1.59; CI: 1.06–2,38; p=0.024), insomnia (OR: 2.12; CI: 1.39–3.18; p<0.001), düşme (OR: 2.10; CI: 1.39–3.17; p<0.001) ve kırılganlık (OR: 2.42; CI: 1.66–3.54; p<0.001) olasılığını artırdığını ortaya koydu.

Sonuç: Üriner inkontinans, yaşlı bireylerde, özellikle kadınlarda sık görülmekte ve depresyon, insomnia, kırılganlık ve düşmelerle ilişkilendirilmektedir. Üriner inkontinansı olan kadınlarda, erkekler ile benzer oranda uykusuzluk ve düşme gözlense de, depresyon ve kırılganlık sıklığı daha fazladır. Sağlık çalışanları, rutin değerlendirmelerde üriner inkontinansı sorgulamalı ve etkilerini yönetmelidir.

Anahtar Kelimeler: Üriner inkontinans, depresyon, insomnia, düşme, kırılganlık

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Highlights

- Urinary incontinence (UI) was highly prevalent among older adults and strongly associated with depression, insomnia, frailty, reduced gait speed, and an increased risk of falls.
- Older women with UI exhibited significantly higher rates of depressive symptoms, frailty, obesity, and low gait speed compared with older men.
- UI was linked to lower functional and cognitive performance, underscoring its multidimensional impact on older adults.
- The findings highlight the need for routine screening of UI during geriatric assessments.

INTRODUCTION

According to the International Continence Society, urinary incontinence (UI) is defined as the involuntary leakage of urine (1). Its prevalence increases with age, making it a widespread condition among older adults and a recognized geriatric syndrome with significant implications for daily functioning and psychological well-being. While the prevalence of UI varies widely across populations, its underlying causes are multifactorial and often interconnected. Recent studies have shown that the prevalence reaches up to 35.0 % in older men and up to 56.3 % in older women (2–4).

In older men, the most common cause of urinary incontinence is overactive bladder syndrome, often resulting from detrusor overactivity due to sensory or neurological changes (5). Overflow incontinence, though less common, may occur due to impaired detrusor contractility or bladder outlet obstruction, as seen in conditions like benign prostatic hyperplasia (BPH) (5). Conversely, in women, stress incontinence is more prevalent due to physiological changes following pregnancy and childbirth (4,6,7). Regardless of these gender-specific differences, aging-related factors such as frailty, cognitive decline, constipation, sarcopenia, and chronic diseases further exacerbate urinary incontinence in both sexes (4,5,7,8).

Urinary incontinence is often underreported among older adults, primarily due to embarrassment and the social stigma associated with the condition. Despite this, healthcare providers must proactively address UI, given its well-documented associations with adverse outcomes such as falls, insomnia, depression, and reduced functional capacity. Research consistently highlights that UI substantially reduces quality of life in elderly populations (9). Evidence further indicates a robust association between UI and an increased risk of falls and fall-related fractures in both genders (10,11). Furthermore, UI significantly disrupts sleep patterns, thereby contributing to insomnia (12). This disruption, in turn, has been identified as a significant risk factor for depression in older adults, particularly when compounded by the emotional burden of UI itself. The social isolation resulting from UI not only exacerbates cognitive decline but also intensifies depressive symptoms (13). This interplay creates a self-perpetuating cycle of psychological and functional impairment, underscoring the multidimensional impact of UI on geriatric health. UI also adversely impacts physical performance, thereby increasing frailty among older adults. Conversely, frailty itself has been shown to exacerbate UI, underscoring a bidirectional relationship. These findings emphasize the interconnected nature of UI and geriatric syndromes, which often compound one another, further complicating the management of older patients. Given the interconnected nature of UI and geriatric syndromes, a comprehensive understanding of their relationships is essential for developing effective interventions and improving the quality of life for older adults. Unlike previous studies focusing on isolated syndromes, this research adopts an integrative approach to evaluate the multidimensional impacts of UI on geriatric health, taking gender differences into account.

MATERIAL and METHODS

The aim of our study was to comprehensively evaluate all geriatric syndromes and to examine the association between urinary incontinence and geriatric syndromes, as well as whether this association differs between genders.

Study Design and Population Selection

The study was retrospectively designed and conducted using the electronic records of patients aged 60 and over who presented to the outpatient geriatric clinic of a tertiary education and research hospital located in the Western Black Sea region, which has the second oldest population in Turkey, between January 2024 and September 2024, and the data were collected in October and November 2024. The patients with comprehensive geriatric assessment data were included in the study. Patients with dementia, delirium, those who experienced cerebrovascular occlusion with resulting neuromuscular paralysis, individuals with active infections, schizoaffective disorder, epilepsy, or other neuromuscular disorders, as well as those who were wheelchair or bed-bound, and patients with advanced chronic obstructive pulmonary disease (COPD) and chronic heart failure (CHF), were excluded from the study.

A retrospective review was conducted on the records of 635 patients who underwent a comprehensive geriatric assessment out of 2,886 patients, of which the records of 576 were accepted for the study. Patients were divided into two groups: those with urinary incontinence complaints and those without. A positive response to the question, 'Have you experienced any urinary leakage, even in small amounts, in the last 3 months?' was considered as the presence of urinary incontinence (14). Subsequently, those with urinary incontinence were further divided into two groups according to gender. The patient selection flowchart is shown in Figure 1.

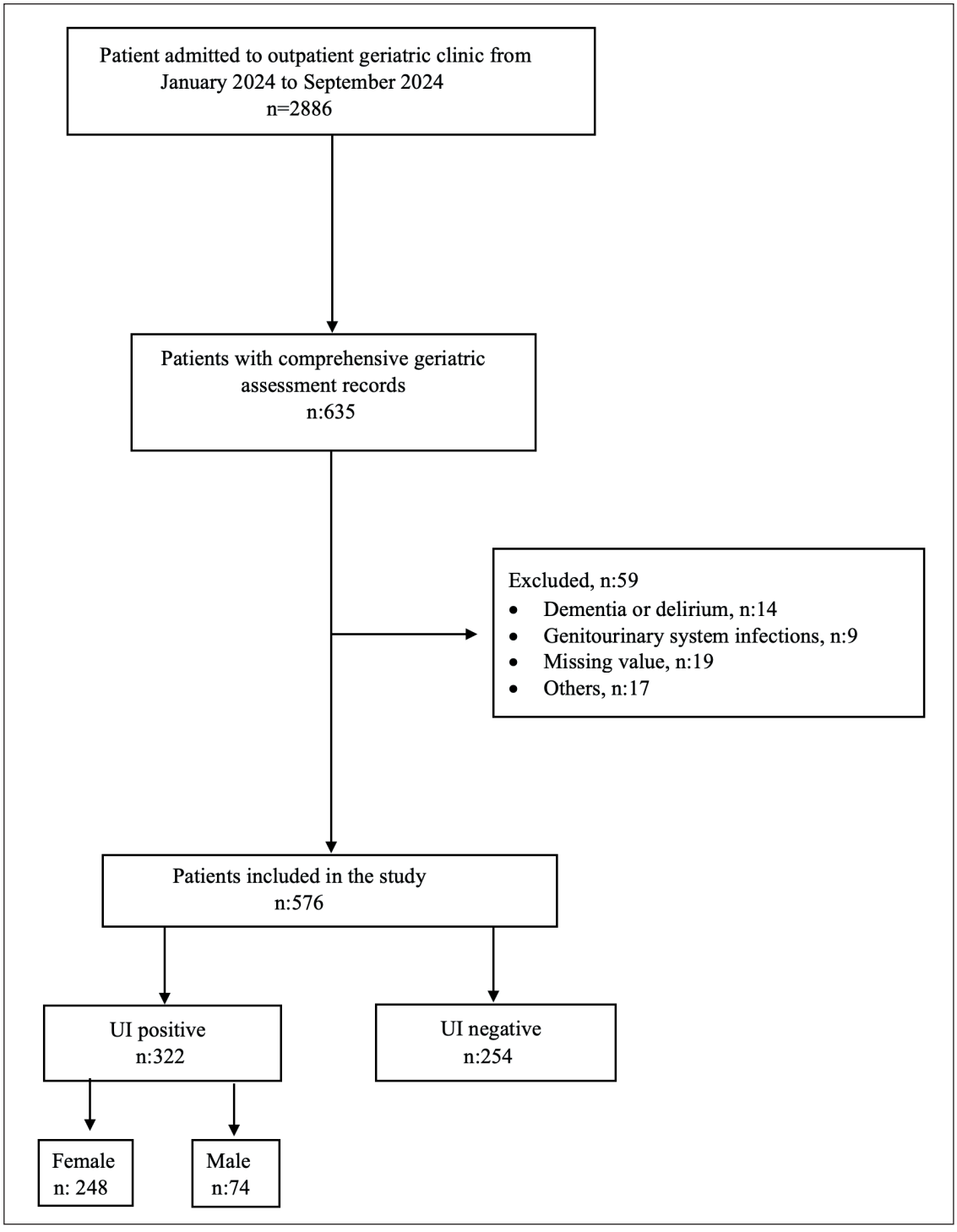

Figure 1: The patient selection flowchart.

Within the scope of the geriatric assessment, patients' functional status was evaluated using the Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) (15) scales, cognitive function was assessed with the Mini-Mental State Examination (MMSE) (16), and depression was evaluated using the Yesavage Geriatric Depression (YGDS) (17). Those with a YGDS score of 5 and above were considered to have depression. The scales used have been previously validated in Turkish, and their standardized scoring systems were applied. Frailty assessment was performed according to the Fried frailty index (18). Those with a score of 3 or higher were considered frail. The medications utilized by patients were documented, and the consumption of five or more medications was categorized as polypharmacy (19). Additionally, all patients were surveyed regarding falls within the past year and, if applicable, the frequency of such the incidents. 4-meter gait speed (GS) test were conducted, and with those GS slower than 0.8 m/s classified as having a low GS (20). Patients experiencing difficulty in initiating or maintaining sleep or wake up early unintentionally were classified as insomnia.

Ethical Approval

Ethical approval for the study was obtained from the Karabük Training and Research Hospital (Nu:1885), and the study adhered to the principles of the Helsinki Declaration throughout its duration. The study was designed as a retrospective investigation, and informed consent forms were not obtained from the participants; however, patient data were accessed with approval from the Institutional Review Board of Kastamonu Education and Research Hospital.

Statistical Analysis

IBM Statistical Package for Social Sciences (IBM SPSS) version 22.0 (SPSS Inc., Chicago, IL, USA) was used for the statistical analyses. The Kolmogorov-Smirnov test was used to assess the data's normal distribution. Average distribution values were shown as mean ± standard deviation (SD) for normally distributed numerical data. The median and minimum-maximum values for the non-normally distributed variable, as well as the frequencies for the categorical data, were presented. When comparing those with and without urinary incontinence, an independent T-test was used to assess differences in numerical variables with a normal distribution, and the chi-square test was employed to compare categorical data. Numeric variables without a normal distribution were analyzed using the Mann-Whitney U test. We conducted univariate and multivariate analyses to assess the association between depression, insomnia, frailty, and fall history as dependent variables and urinary incontinence, along with other factors as independent variables. Odds ratios (ORs) with 95% confidence intervals (CIs) were estimated. An omnibus test was conducted to assess the reliability of the regression analyses. The statistical significance was defined as $p < 0.05$.

RESULTS

The mean age of the study population is 69.82±6.39. A total of 322 patients (55.91%) had complaints of urinary incontinence. 77.01% (n: 248) of these patients were female. Of the patients included in the study, 36.11% presented with depression (n:208), 67.53% reported symptoms of insomnia (n:389), and 44.44% (n:256) were classified as frail (Table 1).

The prevalence of female gender, married, obesity, frailty, low gait speed, depression, history of falls, insomnia, and DM was significantly higher in individuals with urinary incontinence compared to those without ($p<0.001$, $p=0.004$, $p=0.001$, $p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, $p=0.019$, respectively). Similarly, ADL, IADL, and MMSE scores were significantly lower in individuals with urinary incontinence, whereas Fried Frailty Index scores, YGDS scores, and the number of medications used were significantly higher ($p<0.001$, $p=0.045$, $p<0.001$, $p<0.001$, $p=0.003$, and $p=0.026$, respectively) (Table 1). The difference in age and the prevalence of polypharmacy, hypertension (HT), COPD, coronary artery disease (CAD), malignancy, CHF, and chronic kidney disease (CKD) was not found to be significant between patients with and without urinary incontinence ($p=0.071$, $p= 0.140$, $p=0.179$, $p=0.298$, $p=0.142$, $p=0.452$, $p=0.310$, $p=0.400$, respectively) (Table 1).

Older female patients with urinary incontinence demonstrated significantly lower scores in ADL, IADL, GS, and MMSE ($p=0.043$, $p<0.001$, $p<0.001$, $p=0.036$, respectively) compared to their male counterparts, while their YGDS and FI scores were significantly higher than those of men ($p<0.001$, $p<0.001$, respectively). Compared to men, women with urinary incontinence were found to have a significantly higher prevalence of obesity, depression, LGS, and frailty ($p=0.013$, $p<0.001$, $p<0.001$, $p<0.001$, respectively). In contrast, men with urinary incontinence had a significantly higher prevalence of DM, CAD, and being married compared to women ($p=0.004$, $p=0.024$, $p=0.031$, respectively). However, among patients with urinary incontinence, we did not find a significant difference between the two genders in terms of history and frequency of falls, polypharmacy, and insomnia ($p=0.409$, $p=0.215$, $p=0.223$, $p=0.083$, respectively) (Table 2).

In the univariate regression analysis, urinary incontinence was found to significantly increase the risk of depression by 2.04 times (OR: 2.04, 95% CI: 1.43–2.90, $p<0.001$). In the multivariate models, after adjusting for age, gender, marital status, and COPD, urinary incontinence remained significantly associated with a 1.59-fold increase in the likelihood of depression (OR: 1.59, 95% CI: 1.06–2.38, $p=0.024$) (Table 3).

Regarding insomnia, univariate analysis revealed that the presence of urinary incontinence increased the risk of insomnia by 2.63 times (OR: 2.63, 95% CI: 1.83–3.76, p<0.001). After adjusting for age, gender, marital status, polypharmacy, and COPD in the multivariate analysis, urinary incontinence was still associated with a 2.12-fold increased risk of insomnia (OR: 2.12, 95% CI: 1.39–3.18, p<0.001) (Table 3).

For falls, the univariate model demonstrated a 2.95-fold increase in the likelihood of a history of falls associated with urinary incontinence (OR: 2.95, 95% CI: 2.03–4.29, p<0.001). After adjusting for age, gender, and polypharmacy, the multivariate analysis showed that urinary incontinence remained significantly associated with a 2.10-fold increased risk of falls (OR: 2.10, 95% CI: 1.39–3.17, p<0.001**)** (Table 3).

In terms of frailty, the univariate analysis revealed a 2.47-fold increased likelihood of frailty in individuals with urinary incontinence (OR: 2.47, 95% CI: 1.75–3.47, p<0.001). In the adjusted model, accounting for age, gender, and polypharmacy, urinary incontinence was still associated with a 2.42-fold increase in frailty (OR: 2.42, 95% CI: 1.66–3.54, p<0.001) (Table 3).

Table 1: Comparison of patients with and without urinary incontinence

	Total n=576	Patients with UI n=322 (55.91%)	Patients without UI n=254 (44.09%)	p value
Sociodemographic assessment				
Age (mean ±SD)	69.82±6.39	70.25±6.52	69.29±6.19	0.071
Gender (Female)	402 (69.79)	248 (77.01)	154 (60.62)	**<0.001**
Marital Status (married)	393 (81.19)	205 (76.77)	188 (86.63)	**0.004**
Obesity (%)	322 (55.90)	199 (61.80)	123 (48.42)	**0.001**
Geriatric syndromes				
ADL (min-max)	5 (2-8)	5 (2-8)	6 (3-6)	**<0.001**
IADL (mean ±SD)	6.82±1.69	6.69±1.67	6.98±1.71	**0.045**
Gait speed (mean ±SD)	0.81±0.32	0.74±0.27	0.91±0.36	**<0.001**
Low gait speed (%)	242 (42.01)	171 (53.11)	71 (27.95)	**<0.001**
Fried Index (mean ±SD)	2.33±1.23	2.62±1.21	1.96±1.17	**<0.001**
Frailty (%)	256 (44.44)	174 (54.04)	82 (32.28)	**<0.001**
YGDS (mean ±SD)	3.95±2.71	4.42±2.69	3.35±2.61	**<0.001**
Depression (%)	208 (36.11)	139 (43.16)	69 (27.16)	**<0.001**
MMSE (mean ±SD)	25.73±3.21	25.37±3.27	26.18±3.15	**0.003**
Fall history (%)	193 (33.51)	140 (43.47)	53 (20.86)	**<0.001**
Number of falls (min-max)	0 (0-10)	0 (0-10)	0 (0-10)	**<0.001**
Number of drugs (mean ±SD)	5.76±3.26	6.04±3.37	5.42±3.09	**0.026**
Polypharmacy (%)	355 (61.63)	203 (63.04)	152 (59.84)	0.140
Insomnia (%)	389 (67.53)	247 (76.70)	142 (55.91)	**<0.001**
Comorbid diseases				
DM (%)	367 (63.71)	217 (67.39)	150 (59.05)	**0.019**
HT (%)	391 (67.88)	224 (69.56)	167 (65.74)	0.179
COPD (%)	104 (18.05)	61 (18.94)	43 (16.92)	0.298
CAD (%)	128 (22.22)	62 (19.25)	66 (25.98)	0.142
Malignancy (%)	12 (2.08)	6 (1.86)	6 (2.36)	0.452
CCF (%)	32 (5.55)	16 (4.97)	16 (6.29)	0.310
CKD (%)	69 (11.97)	37 (11.49)	32 (12.59)	0.400

UI: Urinary incontinence, **ADL:** Activities of Daily Living, **IADL:** Instrumental Activities of Daily Living, **YGDS:** Yesavage Geriatric Depression Scale, **MMSE:** Mini-Mental State Examination, **HT:** Hypertension, **DM:** Diabetes Mellitus, **COPD:** Chronic Obstructive Pulmonary Disease, **CAD:** Coroner Arterial Disease, **CCF:** chronic heart failure, **CKD:** Chronic kidney disease. The value of $p < 0.05$ is expressed in bold.

Table 2: Gender-based comparison of geriatric syndromes in patients with urinary incontinence

	Total n=322	Female n=248 (77.02%)	Male n=74 (22.98%)	p
Sociodemographic assessment				
Age (mean ±SD)	70.26±6.55	69.88±6.56	71.50±6.26	0,061
Marital status (married)	205 (76.49)	154 (74.03)	51 (86.44)	**0.031**
Obesity (%)	199 (61.80)	162 (65.32)	37 (50)	**0.013**
Geriatric syndromes				
ADL (mean ±SD)	4.98±0.42	4.95±0,50	5.04±0,25	**0.043**
IADL (mean ±SD)	6.71±1.64	6.46±1.68	7.45±1.38	**<0.001**
GS (mean ±SD)	0.74±0.27	0.71±0.26	0.87±0.28	**<0.001**
Low GS (%)	171 (53.11)	144 (58.06)	27 (36.48)	**<0.001**
FI (mean ±SD)	2.61±1.21	2.81±1.18	2.0±1.09	**<0.001**
Frailty (%)	174 (54.03)	153 (61.69)	21 (28.37)	**<0.001**
YGDS (mean ±SD)	4.44±2.72	4.73±2.77	3.36±2.11	**<0.001**
Depression (%)	138 (42.85)	121 (48.79)	17 (22.97)	**<0.001**
MMSE (mean ±SD)	25.42±3.22	25.17±3.21	26.06±3.16	**0.036**
Fall history (%)	139 (43.16)	109 (43.95)	31 (41.89)	0.409
Number of falling (min-max)	0 (0-10)	0 (0-10)	0 (0-5)	0.215
Number of drugs (mean ±SD)	6.04±3.37	6.18±3.41	5.55±3.18	0.165
Polypharmacy (%)	203 (63.04)	161 (67.64)	42 (61.76)	0.223
Insomnia (%)	247 (76.70)	195 (78.62)	52 (70.27)	0.083
Comorbid diseases				
DM (%)	217 (67.39)	158 (63.71)	59 (79.72)	**0.004**
HT (%)	224 (69.56)	178 (41.58)	46 (62.16)	0.118
COPD (%)	61 (18.94)	51 (20.56)	10 (13.67)	0.125
CAD (%)	63 (19.62)	42 (16.93)	21 (28.37)	**0.024**
Malignancy (%)	6 (1.86)	5 (2.02)	1 (1.35)	0.586
CCF (%)	16 (4.96)	12 (4.85)	4 (5.47)	0.516
CKD (%)	37 (11.49)	31 (12.5)	6 (8.11)	0.213

ADL: Activities of Daily Living, **IADL:** Instrumental Activities of Daily Living, **GS:** Gait speed, **FI:** Frailty ındex, **YGDS:** Yesavage Geriatric Depression Scale, **MMSE:** Mini-Mental State Examination, **HT:** Hypertension, **DM:** Diabetes Mellitus, **COPD:** Chronic Obstructive Pulmonary Disease, **CAD:** Coroner Arterial Disease, **CCF:** chronic heart failure, **CKD:** Chronic kidney disease. The value of $p < 0.05$ is expressed in bold.

Table 3: Association of urinary incontinence with '*Depression, Insomnia, Fall history* and *Frailty'*

Model	Depression OR (95% CI)	p	Insomnia OR (95% CI)	p	Fall History OR (95% CI)	p	Frailty OR (95% CI)	p
UI **Crude Model**	2.04 (1.43–2.90)	<0.001	2.63 (1.83–3.76)	<0.001	2.95 (2.03–4.29)	<0.001	2.47 (1.75–3.47)	<0.001
UI **Model 1**	1.75 (1.21–2.52)	0.003	2.40 (1.66–3.46)	<0.001	2.70 (1.84–3.96)	<0.001	2.03 (1.39–2.93)	<0.001
UI **Model 2**	1.59 (1.06–2.38)	0.024	2.12 (1.41–3.17)	<0.001	2.10 (1.39–3.17)	<0.001	2.42 (1.66–3.54)	<0.001
UI **Model 3**	-	-	2.12 (1.39–3.18)	<0.001	-	-	-	-

Model 1: adjusted for age gender
Model 2: adjusted for age gender, marital status and COPD for '*depression*' and '*insomnia*'
Model 2: adjusted for age, gender, and polypharmacy for '*fall history'* and *'frailty'*
Model 3: adjusted for age gender, marital status,COPD and polypharmacy for '*insomnia*'

DISCUSSION

In our study, 55.91% of older patients attending the geriatric outpatient clinic reported urinary incontinence, which was strongly associated with increased levels of depression, insomnia, frailty, and falls. The prevalence of urinary incontinence observed in our cohort was slightly higher than that reported in previous studies. (3,4). This difference may be attributed to the higher rates of DM and frailty among the participants in our study population consistent with the findings of existing literature (3,4). We observed a significantly higher prevalence of urinary incontinence in women compared to men (61.7% in women vs. 42.52% in men). Futhurmore, participants with urinary incontinence (UI) exhibited significantly higher levels of obesity those than without. Shan et al. also reported a greater prevalence of UI among obese older women (21). Possibly mediated through the indirect influence of obesity, the higher prevalence among women is well-documented in the other literatures (3,4).

UI not only causes physical discomfort but also has significant psychosocial implications, particularly increasing the risk of depression in older adults. A meta-analysis of studies has shown a clear association between the presence of UI and depression in the older population (22). Our study consistently demonstrated a significant difference in the prevalence of depression and insomnia between older adults with UI and those without. After adjusting for gender and other potential confounding factors, the presence of UI was found to be associated with a 1.59-fold increased risk of depression. Notably, depressive symptoms were observed to be three times more prevalent in women with UI compared to men, while the frequency of insomnia complaints was similar across both genders. Similar findings were reported in a single-center study conducted among middle-aged adults, which indicated that the impact of UI on depression was more pronounced in women than in men (23). Additionally, a correlation was found between the severity of depression and the severity of UI in this single center study.

The presence of UI symptoms appears to have a greater impact on insomnia than on depression. Although we did not conduct a detailed assessment of nocturnal and diurnal UI complaints, our findings suggest that the presence of UI significantly increases the risk of insomnia by 2.40 times. Additionally, unlike depression, no significant difference in the prevalence of insomnia was observed between women and men with UI. These findings align with those of a study by Leng et al., which involved approximately 25,000 older adults in India, where UI was found to be associated with insomnia in both genders (12).

The fear of incontinence often leads individuals to experience heightened anxiety, which subsequently diminishes their functional capacity. Indeed, our study demonstrated that older adults with UI exhibited reduced gait speed. Furthermore, UI has been shown to result in numerous adverse outcomes among older adults, including urinary tract infections, skin complications, psychosocial challenges, and a reduced quality of life (24). These complications can contribute to a cumulative deficit, a well-documented process that can induce frailty. As such, UI may serve as an important early indicator of frailty. The 4th International Consultation on Incontinence has underscored the necessity for further exploration of the relationship between UI and frailty (25). In a study conducted by Wang et al., involving male residents aged 80 and above in a nursing home in Taiwan, UI was identified as an independent risk factor for frailty (26). Moreover, a meta-analysis comprising 11 studies revealed that UI occurs at a rate twice as high in older adults with frailty compared to those without (8). Our findings further corroborate this relationship, demonstrating that, after adjusting for potential confounding variables, UI is associated with a 2.47-fold increase in frailty.

Individuals with UI demonstrated significantly reduced gait speed and a higher incidence of falls. Our study found that the presence of UI is associated with a 2.12-fold increase in the likelihood of a history of falls, even after adjusting for relevant confounding variables. UI may prompt individuals to engage in urgent behaviors due to the sensation of urgency or the fear of involuntary leakage, which can ultimately lead to falls. A meta-analysis encompassing 38 studies determined that both stress incontinence and urge incontinence are associated with approximately a 1.7-fold increase in the risk of falls (11). Furthermore, our study revealed that women with UI exhibit slower gait speed compared to men with UI, despite a similar history of falls. Research by Sialino et al. demonstrated that women, independent of UI, exhibit lower gait speed, which may be attributed to factors such as depressive symptoms, lower educational attainment, heightened pain perception, and increased body mass index (27).

Limitations and Strengths

The lack of differentiation between the types of urinary incontinence, along with the absence of data on nocturia and the frequency of incontinence episodes, represent notable limitations of our study. Moreover, the retrospective cross-sectional design precludes the establishment of temporal relationships, thereby limiting the ability to draw causal inferences and reducing the external validity of the findings. However, the comprehensive geriatric assessment we conducted, which evaluated patients across a wide range of domains—from frailty to falls, and insomnia to depression—serves as a significant strength. Additionally, the ability to explore and compare the relationship between urinary incontinence and various geriatric syndromes by gender further enhances the study's robustness.

Conclusion

The presence of UI was found to be strongly associated with increased risk of depression, insomnia, and frailty, with a notably higher prevalence of depressive symptoms and frailty in women compared to men. Additionally, UI was identified as a significant risk factor for reduced gait speed and a history of falls. These findings underscore the importance of considering UI not only as a physical health issue but also as a psychological and functional concern that can significantly impair quality of life in older adults. Given the high prevalence of UI in the older population, healthcare providers should be vigilant in screening for UI at routine visits and actively address its impact on both physical and mental health.

Furthermore, our study suggests that UI may serve as an early indicator of frailty, highlighting the need for further research to explore the relationship between UI and frailty in greater depth. Longitudinal studies that investigate the types of UI and their specific associations with geriatric syndromes would provide valuable insights to guide targeted interventions and improve patient outcomes.

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Author Contributions

Study design and conceptualization: **Sultan Keskin Demircan;** data collection: **Sultan Keskin Demircan, Zeynep Ece Aytar, Gülşah Börekci Semiz;** analysis and interpretation of the results: **Sultan Keskin Demircan;** preparation of the manuscript draft: **Sultan Keskin Demircan, Zeynep Ece Aytar, Gülşah Börekci Semiz.** All authors reviewed the results and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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Ethical Approval

Approval was granted by the Karabük Training and Research Hospital (protocol number:2024/1885).

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