Urinary symptoms, falls and fear of falling in older people with cognitive impairment

Sintomas urinários, quedas e medo de cair em idosos com comprometimento cognitivo

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Abstract

Introduction: Among geriatric syndromes, cognitive impairment, urinary incontinence, nocturia, and falls stand out. Older adults with urinary incontinence are more prone to falls and exhibit fear of falling. **Objective:** To investigate the frequency of urinary incontinence and nocturia and evaluate the association of these variables with falls and fear of falling in older individuals with cognitive impairment. **Methods:** Cross-sectional study with older adults referred from Basic Health Units with cognitive impairment evaluated between 2019 and 2021. Information on urinary incontinence, nocturia, history of falls, and fear of falling provided by the participants and their caregivers was collected. Data were analyzed using Chi-square tests and univariate logistic regressions. **Results:** Data from 89 older adults were analyzed, of whom 58.4% had urinary incontinence, 28.1% had nocturia, 67.4% reported fear of falling, and 41.6% reported falls in the last six months. The group with urinary incontinence [$\chi^2(1) = 5.147$; $p = 0.023$] and the group with nocturia [$\chi^2(1) = 4.353$; $p = 0.037$] had significantly higher frequencies of fear of falling. No differences in the frequencies of history of falls were observed between individuals with and without urinary incontinence or nocturia ($p > 0.05$). Fear of falling was associated with urinary incontinence (OR = 2.833; 95% CI 1.137 – 7.062) and nocturia (OR = 3.365; 95% CI 1.033 – 10.966). **Conclusion:** Older adults with cognitive impairment have a high frequency of urinary incontinence, nocturia, falls, and fear of falling. Furthermore, there is an association between urinary incontinence, nocturia and fear of falling in this population.

Keywords: Accident prevention. Health of the Elderly. Accidental falls. Nocturia. Urinary incontinence.

Resumo

Introdução: *Entre as síndromes geriátricas, destacam-se o comprometimento cognitivo, a incontinência urinária, a noctúria e as quedas. Idosos com incontinência urinária são mais propensos a cair e apresentar medo de cair.* ***Objetivo:*** *Investigar a frequência de incontinência urinária e noctúria e avaliar a associação dessas variáveis com a ocorrência de quedas e com o medo de cair em idosos com comprometimento cognitivo.* ***Métodos:*** *Estudo transversal com idosos encaminhados das Unidades Básicas de Saúde com comprometimento cognitivo avaliados entre os anos de 2019 e 2021. Foram coletadas informações sobre incontinência urinária, noctúria, histórico de quedas e medo de cair, fornecidas pelos idosos e seus acompanhantes. Os dados foram analisados por meio dos testes qui-quadrado e regressões logísticas univariadas.* ***Resultados:*** *Foram analisados dados de 89 idosos, dos quais 58,4% apresentavam incontinência urinária, 28,1% apresentavam noctúria, 67,4% tinham medo de cair e 41,6% relataram quedas nos últimos seis meses. O grupo com incontinência urinária [$\chi^2(1) = 5,147$; $p = 0,023$] e o grupo com noctúria [$\chi^2(1) = 4,353$; $p = 0,037$] apresentaram frequências significativamente maiores de medo de cair. Não foram observadas diferenças das frequências de histórico de quedas entre os indivíduos com e sem incontinência ou noctúria ($p > 0,05$). O medo de cair se mostrou associado à incontinência (OR = 2,833; IC95% 1,137 – 7,062) e à noctúria (OR = 3,365; IC 95% 1,033 – 10,966).* ***Conclusão:*** *Idosos com comprometimento cognitivo apresentam alta frequência de incontinência urinária, noctúria, quedas e medo de cair. Ademais, há associação da incontinência urinária e da noctúria com o medo de cair nessa população.*

Palavras-chave: *Prevenção de acidentes. Saúde do idoso. Acidentes por quedas. Noctúria. Incontinência urinária.*

Introduction

The increase in the proportion of adults over 65 years old has made geriatric syndromes more apparent. Among this set of multifactorial conditions that affect vulnerable older individuals, cognitive impairment, urinary incontinence (UI), nocturia, and falls stand out.[1] UI is defined as the complaint of involuntary urine loss, while nocturia is the complaint of sleep cycle interruption due to a need to urinate, followed by a new period of sleep.[2] UI and nocturia are risk factors for mortality in the older adults, closely related to declines in cognitive function and performance of activities of daily living, and may result in an increased risk of falls.[3]

Falls are unexpected events where a person goes to the ground or a lower level in relation to their initial position.[4] This event affects approximately 28 to 35% of people over 65 years old every year. Consequences of falls include fractures, immobilization, activity restriction, institutionalization, psychological impairments such as fear of new falls, appearance of other diseases, pain, functional decline or disability, physical activity, hospitalization, and death.[5] Along with falls, fear of falling, defined as a cautious concern about falling, ultimately results in limitations in activities of daily living and tends to cause insecurity in balance, leading the older population to reduce their activities and mobility, and may result in greater functional decline and increased risk of future falls.[6,7]

Cognitive impairment is a deficit in one or more important brain functions such as memory, learning, concentration, decision-making, processing speed, and motor function.[8,9] Patients with cognitive impairment have a higher frequency of falls when compared to their cognitively unimpaired counterparts.[10] Additionally, cognitive impairment has been strongly associated with lower urinary tract symptoms, particularly UI.[9] Despite resulting in an increased risk of falls among older adults, nocturia has not yet established its influence on cognitive impairment.[9]

Researchers have identified UI and nocturia as risk factors for falls for several reasons, such as slipping on wet surfaces after urine loss, rushing to the bathroom leading to tripping, and increased frequency of bathroom visits together with impaired vision and balance.[11] Older people with UI have a 61% higher chance of falling once or more and a 63% greater likelihood of falling recurrently compared to those without UI.[1] Additionally, researchers have identified the relationship between UI and fear of falling, indicating that incontinent older individuals have a 1.62 times higher chance of experiencing fear of falling.[12]

However, there are few studies on the subject, significant variability in study designs, and a scarcity of evidence, which contributes to the continued uncertainty surrounding the strength of the association between UI and nocturia and the occurrence of falls and fear of falling.[1,12] In this scenario, elucidating the association between UI and nocturia and the increased occurrence of

falls and fear of falling in older individuals with cognitive impairment will reinforce clinicians' understanding of the importance of concomitant screening for these geriatric syndromes. In this context, the aim of this study was to investigate the frequency of UI, nocturia, falls, and fear of falling in older adults with cognitive impairment treated in specialized public services and assess the association between UI and nocturia and the occurrence of falls and fear of falling in this population.

Methods

This is an observational, cross-sectional, and analytical study approved by the Research Ethics Committee of the Faculty of Ceilândia at the University of Brasília (Protocol 3.650.491, of October 18, 2019). All participants who agreed to participate in the research signed the Informed Consent Form.

Setting

This study was conducted using the database of older individuals treated at the welcome center developed by the Health Department at the Western Health Region Polyclinic of the Federal District. This service was provided to older adults referred by Basic Health Care Units who required specialized geriatric assessment and met some of the following criteria: dependence in basic activities of daily living; cognitive impairment (cognitive decline, dementia, depression, delirium/mental confusion); parkinsonism; urinary or fecal incontinence; partial or total immobility; postural instability (repeated falls, low impact femur fractures); polypathology (five or more diagnoses); polypharmacy (five or more medications); clinical decompensations or frequent hospitalizations.

Thus, a multidimensional assessment of the older adults admitted for follow-up by the geriatrics team was conducted. This team was previously trained and conducted each assessment at a single meeting. The data contained in the database were collected through interviews with the older individuals and their caregivers.

Sample

A convenience sample was selected from the database of older individuals treated between 2019 and 2021. Older individuals aged 60 years or older of both sexes with confirmed cognitive impairment based on the Mini-Mental State Examination were considered eligible for the study.[13] Older adults with intact cognitive function, wheelchair users, and those using diapers were excluded. Cognitive impairment was identified based on education level. Considered cognitively impaired were individuals with more than seven years of schooling and a score of less than 28 points; with four to seven years of schooling scoring less than 24 points; with one to three years of schooling, scoring less than 23 points; and for illiterate individuals, scoring less than 19 points.[14]

Participant characteristics

Participants were characterized according to sociodemographic data (age), schooling (number of years), and sex (female or male). For the description of clinical conditions, data on regular physical exercise (yes or no), functional capacity assessed by the Pfeffer questionnaire,[15,16] body mass index (BMI), and continuous use medications (number) were used. Regular physical exercise was defined as bodily movement produced by skeletal muscles that significantly increases energy expenditure, and physical inactivity as not meeting public health recommendations of 150 minutes per week of moderate to vigorous physical activity in sessions of at least 10 uninterrupted minutes.[17,18]

The Pfeffer questionnaire assesses the instrumental activities of daily living and the functional capacity of older adults with cognitive impairment. It consists of 10 questions on the ability to prepare meals, do shopping, use transportation, perform household chores, use the telephone, manage finances, administer medication, spatial and temporal orientation, and attention level.[15,16] Scores range from 0 to 3 points for each question, with a maximum score of 30 points. Scores between 0 and 5 points characterize independence, and between 6 and 30 functional dependence.[16] The characterization variables were considered possible confounders in adjusted analyses.

Urinary incontinence

For collecting information on UI, the older individual was asked if they needed to immediately go to the bathroom when they felt the urge, or if they experienced urine leakage into their clothes when delaying going to the bathroom or during any exertion (such as sneezing,

coughing, or lifting weights).[2] This information was self-reported and confirmed by their caregiver. The older adult was considered incontinent if they responded affirmatively to any of these questions.

Nocturia

Unlike UI, nocturia is defined as waking up to urinate during the main sleep period.[2] This variable was self-reported by the older individual and confirmed by the caregiver using the following questions: "In the last month, did you get up to urinate during the night? How many times did you wake up per night to urinate?" The older adult was considered to have nocturia if they answered affirmatively to this question, indicating waking up to urinate one or more times during the night.

Falls

A fall is defined as an unexpected event in which the participant goes to the ground or to a lower level from their initial position.[4] The history of falls in the last six months was based on self-reports and confirmed by the caregiver. For analysis purposes, study participants were categorized into fallers (≥1 fall) and non-fallers (no falls) according to the number of falls reported.

Fear of falling

Fear of falling is defined as a cautious concern about falling that ultimately limits activities of daily living.[7] Information about the older individual's fear of falling was self-reported and confirmed by the caregiver, by answering the following questions: is the older adult afraid of falling or do they refrain from any activities in their daily life due to fear of falling. For the analyses, study participants were categorized as those afraid and not afraid of falling.

Statistical analysis

Numerical variables were descriptively analyzed using measures of central tendency (mean and median) and variability (standard deviation and range). Categorical variables were descriptively analyzed using measures of absolute frequency and percentage frequency. Normal data distribution was assessed via the Kolmogorov-Smirnov test, with age and BMI exhibiting normal distribution. Fear of falling frequency and history of falls were compared between groups of older individuals with and without UI, and between those with and without nocturia using the chi-square test. Multivariate logistic regressions were conducted to assess the association between UI and nocturia with the history of falls and fear of falling, adjusted for sex, age, BMI, functional capacity, and number of medications. A significance level of $\alpha = 0.05$ was established. Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 21.0.

Results

All individuals referred from Basic Health Units to the geriatrics service of the Polyclinic of the Health Region of the Federal District, during the study period, were assessed for eligibility criteria. In total, 185 eligible individuals underwent the initial screening. Of these, 96 were excluded for not having cognitive impairment, being wheelchair-bound, or using diapers (Figure 1).

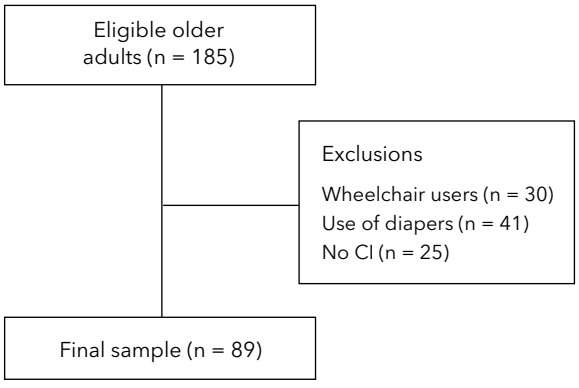

Figure 1 - Sample flowchart.

Note: CI = cognitive impairment.

The analysis was conducted with 89 older individuals, aged between 60 and 93 years. The majority of study participants were female (73%), inactive (88.8%), normal weight (32.6%), or overweight (47.7%). Among the study participants, 58.4% exhibited UI, 28.1% nocturia, 67.4% fear of falling, and 41.6% reported a history of falls in the last six months. Table 1 shows the characteristics of the study participants.

Compared to the group without UI, individuals with UI showed significantly higher frequencies of fear of falling [$\chi^2(1) = 5.147$; $p = 0.023$]. Compared to the group without nocturia, those with nocturia also exhibited significantly higher frequencies of fear of falling [$\chi^2(1) = 4.353$; $p = 0.037$]. No differences in the frequency of falls were observed between individuals with and without UI or nocturia ($p > 0.05$) (Table 2).

Table 1 - Sociodemographic, clinical and anthropometric characteristics of the study participants (n = 89)

Variable	Parameter
Sex (female)[a]	73.0 (65)
Age (years)[b]	77.4 (7.56)
Schooling (years of study)[c]	3 [0 - 4]
Physical exercise (no)[c]	88.8 (79)
BMI (kg/m²)[a]	27.4 (5.89)
Low weight (BMI < 22 kg/m²)[c]	19.8 (17)
Normal weight (BMI = 22 – 27 kg/m²)[c]	32.6 (28)
Overweight (BMI ≥ 27 kg/m²)[c]	47.7 (41)
Functional capacity (Pfeffer)[b]	15 [3 – 75]
Independent[c]	31.7 (26)
Dependent[c]	68.3 (56)
Number of medications[b]	5 [3 – 7.5]
Incontinence[c]	58.4 (52)
Nocturia[c]	28.1 (25)
Fear of falling[c]	67.4 (60)
History of falls[c]	41.6 (37)

Note: BMI = body mass index. [a]Mean (standard deviation); data with normal distribution. [b]Median [25 - 75% percentile]; data with nonnormal distribution. [c]Percentage frequency (absolute frequency).

Table 2 - Characteristics of study participants with and without urinary incontinence/nocturia

Characteristic	Without	With	p-value
Incontinence			
Fear of falling*[a]	54.1 (20)	76.9 (40)	0.023
History of falls[a]	40.5 (15)	42.3 (22)	0.868
Nocturia			
Fear of falling*[a]	60.9 (39)	84.0 (21)	0.037
History of falls[a]	42.2 (27)	40.0 (10)	0.851

Note: *p < 0.05. [a]Data in frequency percentage (absolute frequency).

Table 3 presents the multivariate logistic regression analysis of factors associated with UI and nocturia, adjusted for confounders. Fear of falling was associated with incontinence (OR = 2.833; 95% CI 1.137 – 7.062) and nocturia (OR = 3.365; 95% CI 1.033 – 10.966).

Table 3 - Multivariate logistic regression analysis of fall history and fear of falling with urinary incontinence and nocturia

Variable	Odds ratio (95%CI)	p-value
Urinary incontinence		
Fear of falling	3.939 (1.351 – 11.488)	0.012*
Sex	0.437 (0.137 – 1.393)	0.162
Age	0.982 (0.916 – 1.052)	0.600
Functional capacity	0.997 (0.947 - 1.050)	0.919
BMI	0.950 (0.871 – 1.036)	0.247
No. of medications	1.087 (0.913 – 1.296)	0.349
History of falls	1.148 (0.440 – 2.998)	0.778
Sex	0.675 (0.227 – 2.002)	0.478
Age	1.021 (0.959 – 1.087)	0.516
Functional capacity	0.976 (0.931 – 1.022)	0.301
BMI	0.964 (0.887 - 1.047)	0.383
No. of medications	1.017 (0.871 – 1.189)	0.828
Nocturia		
Fear of falling	4.397 (1.079 – 17.916)	0.039*
Sex	0.488 (0.157 – 1.517)	0.215
Age	0.996 (0.931 – 1.066)	0.917
Functional capacity	0.996 (0.945 – 1.049)	0.869
Body mass index	0.947 (0.866 – 1.035)	0.227
No. of medications	1.052 (0.884 – 1.252)	0.570
History of falls	1.344 (0.461 – 3.916)	0.588
Sex	0.668 (0.225 – 1.980)	0.467
Age	1.023 (0.961 – 1.088)	0.482
Functional capacity	0.974 (0.929 – 1.021)	0.275
Body mass index MI	0.963 (0.886 – 1.046)	0.366
No. of medications	1.013 (0.866 – 1.184)	0.875

Note: No. = number. *p < 0.05.

Discussion

The present study demonstrated that UI, nocturia, fear of falling, and fall occurrences are highly prevalent among older adults with cognitive impairment. Furthermore, it was shown that older individuals with cognitive

impairment who have UI or nocturia exhibit a greater frequency of fear of falling, although this same relationship was not observed with fall occurrences.

The high prevalence of fear of falling observed in this study (67%) corroborates previous findings, especially in terms of the larger number of falls, female sex, and age above 70 years, albeit not specifically in older individuals with cognitive impairment.[19] The occurrence of falls (41.6%) observed in this study was higher than that frequently observed in individuals over 65 years old (28 to 35%), since the study sample consisted of older adults with cognitive impairment and, therefore, at a greater risk of falling.[1,10] With respect to UI, a high frequency (58.4%) was observed, which corroborates previous findings.[20] This condition is closely related to cognitive decline, limitations in activities of daily living, and advanced age, with common factors including obesity, diabetes, loss of independence, depression, anxiety levels, and agitation.[3]

Increasing age diminishes bladder capacity and the sensation of emptying, detrusor muscle contraction rate, and pelvic floor muscle resistance, and contributes to increased residual urine.[20] Finally, despite the high frequency of nocturia observed in this study, previous findings indicate even higher frequencies in patients over 70 years old (ranging from 60 to 85.2%).[9,21] These high frequencies of nocturia have been associated with advancing age, excessive fluid intake during the night, primary sleep disorders, diabetes mellitus, lower urinary tract obstruction due to benign prostatic hyperplasia, overactive bladder, cardiovascular disease, and congestive heart failure.[22]

In this study, older adults with cognitive impairment who had UI or nocturia had an approximately three times higher chance of reporting fear of falling. Few literature studies have investigated the association between UI and nocturia and fear of falling in the older population. However, Sohn et al.,[12] indicated fear of falling as a factor associated with UI in Korean women aged 65 or older (OR = 1.62; 95% CI = 1.18 to 2.22). Additionally, Moon et al.[23] observed a larger proportion of fear of falling (37.9%) among women aged 40 or older with overactive bladder, reflecting a 2.7 times greater likelihood of being afraid of falling than those without overactive bladder. The urgency resulting from UI in these women may lead to the need to rush to the bathroom to avoid urinary leakage and this contributes to their fear of falling. In regard to the association between nocturia and fear of falling, despite the lack of research, the present study highlights that the need to get up at night to go to the bathroom in poorly lit environments is associated with balance and vision problems commonly observed with increasing age.[23-25]

However, no association was identified between UI or nocturia with the history of falls, possibly because the older individual or caregiver did not recall previous falls or because the investigation period was restricted to six months. Although Sohn et al.[12] found a relationship between UI and fear of falling, this association also did not persist with the occurrence of falls even during a two-year investigation period. These findings contradict results presented by previous studies,[1,11,21] which observed a significant association between incontinence and falls and indicated that this relationship is sustained by the possibility of slipping on wet surfaces after urine loss, increased frequency of bathroom visits, and the need to rush to the bathroom. Unlike the present investigation, cross-sectional studies consistently showed an association between nocturia and falls.[26] This has been explained by the need to wake abruptly to urinate and sleep fragmentation, causing daytime drowsiness, which also increases the risk of falling.[24] Additionally, the chronic impacts of nighttime awakening due to frequent urination can result in impaired attention, psychiatric problems, and organic diseases.[24]

The present study has some limitations that should be carefully analyzed. Its cross-sectional design prevents drawing conclusions about causal relationships between UI/nocturia and fear of falling/fall history. Because the study is based on self-reporting by the older individuals with cognitive impairment or the caregiver, both may not have remembered falls that occurred before the research, resulting in a memory bias. Another factor to consider in interpreting the results is the six-month period for investigating the history of falls, given the possibility of falls occurring a long time ago. However, a short investigation period was used in an attempt to reduce memory bias. Furthermore, the investigation of different subtypes of incontinence and nocturia through self-reporting rather than conventional gold-standard assessment instruments limits the interpretation of associations between specific types of UI and nocturia with fear of falling and/or falls that could exist in this population.

Future studies should seek to address this limitation by using a three-day voiding diary,[27] but with caution due to the irregular sleep and interpretation difficulties of the diary that older people with cognitive impairment may exhibit. Additionally, stratified analyses based on UI subtypes may modify the associations identified in the present study, constituting a relevant consideration for researchers dedicated to this area of investigation.

Identifying the association between UI, nocturia, and fear of falling in older adults with cognitive impairment contributes to strengthening the understanding of clinicians working with this population, reinforcing the importance of screening for fear of falling in older adults with urinary dysfunctions. This understanding is particularly important since fear of falling is a risk factor for falls.[28] In this sense, it also sheds light on urinary dysfunctions in the implementation of fall prevention strategies. As such, the findings of this study contribute to the inclusion of investigating fear of falling in patients with UI and nocturia, as well as including urinary symptom assessments in patients with fear of falling.

Conclusion

It is concluded that older individuals with cognitive impairment exhibit a high frequency of UI, nocturia, falls, and fear of falling. Furthermore, UI and nocturia are significantly associated with fear of falling in this population. These findings underscore the important role of healthcare professionals in simultaneously screening for incontinence, nocturia, and fear of falling, in order to establish prevention and treatment strategies for these geriatric syndromes in older adults with cognitive impairment.

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Authors' contributions

RSB, FSS, PAG, SAP, and ATA were responsible for the conception and design of the study, analysis and interpretation of the data. RSB, FSS, and PAG contributed to the writing and revision of the manuscript. All the authors approved the final version.

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