Can clinical and physical-functional factors predict falls in cognitively impaired older adults?

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Abstract

Objective: to investigate the frequency of falls and clinical and physical-functional factors associated with falls, and the accuracy of such factors to identify the risk of falling in cognitively impaired older adults. *Method:* a cross-sectional study with cognitively impaired older adults was carried out using the Mini-Mental State Examination. The dependent variable was a history of falls in the previous six months. The independent variables were self-reported mental confusion, hearing and visual impairment, physical fatigue, muscle weakness, dizziness, body imbalance, insecurity when walking, diagnosed depression, hospitalizations, continuous use medications (form from study used), muscle mass (calf circumference) and handgrip strength (dynamometry), functional capacity (Pfeffer) and mobility (SAM-Br). Descriptive statistics were applied. The groups were compared using the Mann Whitney U test, the risk factors were identified by univariate and multivariate logistic regression, and the area under the ROC curve (AUC) was calculated for the associated factors. *Results:* 216 cognitively impaired older adults were included in the analysis, 41.7% of whom were fallers. Multivariate regression analyzes indicated that complaints of visual impairment (OR=2.8; p=0.015) and body imbalance (OR=2.7; p=0.004), and greater medication use (OR=1.1; p=0.038) were associated with a history of falls. The AUC found poor accuracy for quantity of medications as a screening tool for fallers (AUC=0.6 [0.5; 0.7]; p=0.028). *Conclusion:* cognitively impaired older adults had a high frequency of falls. Complaints of visual impairment, body imbalance and polypharmacy were predictors of falls. The early assessment of these factors can contribute to the identification of cognitively-impaired older adults at risk of falling in clinical practice and research.

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INTRODUCTION

Cognitive impairment and dementia are important clinical syndromes and a common health concern in older adults[1]. Mild Cognitive Impairment (MCI) is considered an intermediate state between the normal cognitive changes of aging and the early clinical characteristics of dementia, particularly Alzheimer's disease[2]. Dementia, meanwhile, relates to progressive neurodegenerative processes that affect various areas of cognition[1]. It is estimated that MCI is present in 16% of the population aged over 70 years[3]. The consequent deficits in memory, temporal orientation, language, problem solving, attention, motor initiation and executive functions related to planning and working memory can result in impairments in the functional capacity of these older adults and increase the risk of falls[1,3].

Falls represent a severe problem for cognitively impaired older adults[4]. Approximately 60% of such adults fall each year[5]. This rate is approximately double that of non-cognitively impaired older adults[1]. Falls negatively affect function, can cause bone fractures, chronic pain, depression and fear of falling, reduce quality of life and are associated with frailty and death[3,6]. In addition, a long-lived cognitively impaired older adult who is a victim of falls is at greater risk of serious injury, resulting in excessive health costs[3,7].

Older patients with MCI have multiple chronic conditions, reduced mobility, deficiencies in muscle strength, reaction time, balance and sensorimotor, and a greater fear of falling, explaining their greater predisposition to falls[8,9]. A history of falls[6,10], poor performance in balance and gait tests and increased postural sway have been shown to be associated with the risk of falling [4,6,10–12]. Neuro-cardiovascular problems[11], declining verbal fluency [10], attention deficit, spatial disorientation, use of psychotropic drugs[13] and polypharmacy[8,10] are equally related to falls. In the same way, depression[6,8], high levels of anxiety[4] combined with impulsivity and agitation[4] increase the chance of falling in older adults with dementia.

These clinical and physical-functional characteristics have already been shown to be related to the increased likelihood of falls in older adults with cognitive deficits and dementia. However, most studies have investigated these risk factors using specialized instruments and with greater evaluation complexity[4,8–10,12].

The hypothesis of the present study is that common complaints related to the clinical and physical-functional components reported by older adults with cognitive deficits and/or by their caregivers are also associated with the occurrence of falls and enable the early identification of older adults at greater risk in a comprehensive manner by the entire health team. In this context, the objectives of the present study were to investigate the frequency of falls, the clinical and physical-functional factors associated with the same and the accuracy of these factors to identify the risk of falling in cognitively impaired older adults.

METHOD

An observational, cross-sectional and analytical study was undertaken. The sample, selected for convenience, was recruited from January 2018 to January 2019 at an older adults care service in a secondary care unit of the State Department of Health of the Distrito Federal (the Federal District), Brazil. This health unit serves, for the most part, older adults from the western health region of the Distrito Federal, in which approximately 90,000 older adults live, according to the District Household Sample Survey, 2015. This unit provides care for older adults aged over 60 years of age, referred from primary care units, with morbidities that are difficult to control, multi-comorbidities, polypharmacy or clinical conditions (such as neurocognitive diseases) that require specialized evaluation by the geriatric team. All referred older adults are evaluated during intake and, based on this first multidimensional evaluation, are admitted for follow-up at the geriatric service or counter-referred to primary care with appropriate instructions.

The present study included older community residents of both sexes, aged 60 years or older, who presented cognitive disorders according to the Mini-Mental State Examination (MMSE). To identify cognitive impairment, the following cutoff points

were adopted: 28 for individuals with more than 7 years of schooling, 24 for those with 4-7 years of schooling, 23 for those with 1-3 years of schooling and 19 for illiterates[14]. Older adults who presented records with ineligible or incomplete data from the cognitive assessment and/or the occurrence of falls were excluded.

The sample calculation was performed in the GPower version 3.1 program with the first 20 fallers and 20 non-fallers included in the study, based on the effect size of the intergroup comparison for the variables: amount of continuous use medications (d=0.70), muscle mass (d=0.78), functional capacity (d=0.50) and mobility (d=0.55). In order to guarantee a power of 90% and an alpha error of 5% in these comparisons, a minimum sample of 172 participants was calculated (86 fallers and 86 non-fallers older adults).

Falls were the dependent variable of the study and were defined as the occurrence of an unintended event that results in the individual's position changing to a lower level, in relation to their initial position[15]. This variable was identified through self-reporting, with the older adult and/or their caregiver asked: *Did the older adult suffer a fall in the last six months*? Those who responded positively were asked about the number of falls during this period. According to the number of falls reported, older adults were grouped into *non-fallers* (0 falls) or *fallers* (1 or more falls) individuals.

The independent variables were the clinical and physical-functional characteristics of older adults. Data were collected using an initial form, developed by the researchers, and specific instruments of rapid, low complexity application, validated for individuals with cognitive impairment, used in the intake service. The questions were directed at the older adult and/ or their caregiver.

The clinical data, investigated by means of self-reporting (presence or absence) were: mental confusion, hearing and visual impairment, physical tiredness, diagnosis of depression, history of hospitalizations and number of continuous use medications. Mental confusion was characterized as a change in the level of consciousness with a reduced attention span accompanied by a change in cognition

or disturbance of perception that developed over a short period of time (hours or days) and which tended to fluctuate throughout the day[16]. To identify the presence of hearing impairment, personal perceptions were identified through the question *Do you feel you have hearing loss*? Visual impairment was identified by asking the individuals about their ability to see clearly during routine activities, under various levels of light, considering visual acuity, contrast sensitivity and depth perception.[17] Physical fatigue was characterized by the sensation perceived by the older adult or by their caregiver as an unpleasant subjective symptom that varies from tiredness to exhaustion, and which interferes with the normal functioning capacity and quality of life of these individuals[18]. The presence of depression was identified by means of a previous medical diagnosis reported by the older adult or their caregiver and the history of hospitalizations through the report of hospitalization or admission to an emergency care unit for at least 24 hours in the previous six months. They were asked about the number of continuous use medication, and polypharmacy was defined as the regular use of five or more medications associated with the reported diseases (excluding dietary supplements)[19].

The physical and functional data investigated through self-reporting (presence or absence) were complaints of muscle weakness, dizziness, body imbalance and insecurity when walking. Muscle mass, muscle strength, mobility and functional capacity were also measured. The complaint of muscle weakness was identified through the question *Do you have difficulty getting up from a chair?*[20]. Dizziness was defined as the feeling of instability or imbalance, which can generate the fear of falling[21]. Body imbalance represented the loss of the ability to control the intentional movements of the body mass center on the support base during the performance of activities that involved the transfer of weight[22]. Insecurity when walking was determined by excessive worry or anxiety about falling that limits the performance of activities of daily living[23].

Muscle mass was inferred by measuring calf circumference (CC), in centimeters, using a tape measure. This measurement was performed on the dominant limb with the older adults sitting, with their knee flexed and their feet supported,

forming a right angle in the knee and ankle joints. The measuring tape was positioned horizontally around the maximum calf circumference[24].

Muscle strength was measured using the isometric handgrip strength (HGS) in Kgf using a Saehan® manual hydraulic dynamometer. This measure has excellent reliability in older adults with questionable, mild and moderate dementia, enabling its use in research and clinical practice.[25]. For the assessment of HGS, the older adults were seated, with their feet touching the ground and the dominant upper limb in adduction, the elbow joint flexed at 90° and the forearm in the neutral position[26]. Three attempts were made, with a one-minute interval between each, and the average of these measures was used for analysis.

The mobility of the older adults was assessed using the Brazilian version of the Southampton Assessment of Mobility (SAM-BR). This instrument assesses the performance of older adults with cognitive impairment in 18 items, based on the assessment of five tasks, for which they receive a score of 1 (if performed) or 0 (if not performed) in each item, with a total score from 0 to 18 points. It is a simple control instrument, with easy and effective clinical applicability, and which has demonstrated "almost perfect" intra-examiner and inter-examiner agreement for mild and moderate dementia (Kappa from 0.79 to 0.89)[27].

The functional capacity of the older adults was assessed using the Pfeffer[28] questionnaire, which was applied to the caregiver to assess the degree of independence of older adults for the performance of ten tasks. The final score was obtained by adding the scores of the items (0–30).

To characterize the participants, age, sex, years of schooling, level of physical activity, nutritional status and reports of previous diagnosis of dementia were identified. To determine the level of physical activity of the older adults, they were asked how many minutes per week they practiced physical exercise of moderate to vigorous intensity, and were classified into active (≥150 minutes of moderate activity per week or ≥75 minutes of vigorous activity) or sedentary[29]. Body Mass Index [BMI= body mass (kg) /height²(m²)] was calculated, which allowed the nutritional status of the older adults to be classified as underweight (BMI<22 kg/m²), normal weight (BMI 22-27 kg/m²) or overweight (BMI> 27 Kg/m²)[30].

The collection of sociodemographic, clinical, anthropometric and physical-functional data was performed in a single day, by seven trained examiners from the nursing and physiotherapy team, and lasted approximately one hour.

Continuous data were expressed as mean and standard deviation and categorical data as percentage and absolute frequency. The non-normal distribution of continuous data was observed using the Kolmogorov-Smirnov test. The frequency of previous falls was calculated using the number of cases with reports of previous falls and the total number of older adults studied. Differences in continuous data between non-fallers and fallers subgroups were analyzed using the U Mann Whitney test and categorical data using the Chi-square test. Univariate logistic regression analysis was used to determine the association between each independent variable and the dependent variable. Odds Ratios (OR) were calculated for each explanatory variable with 95% confidence intervals. Subsequently, variables with an association with a p-value less than 0.05 in univariate regression analysis were included in the multivariate logistic regression analysis in order to investigate the independent effect, when taken together, of these variables to predict falls in older adults with cognitive deficits. The selection of the best model was carried out using the variable reduction procedure based on the forward stepwise method. In order to analyze the accuracy of the factors that remained associated with falls in multivariate regression analysis, Sensitivity (S), Specificity (SP), Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were calculated. The ROC curve was constructed and the area under the curve (AUC) (with 95% confidence interval) was calculated for the continuous variables. AUC values between 0.51 and 0.69 represented weak discriminative capacity and AUC values equal to or greater than 0.70 determined satisfactory discriminative capacity. A significance level of 5% was considered.

The study was approved by the Ethics and Research Committee of the Ceilândia Faculty of the

Universidade de Brasília (the University of Brasília) under Opinion No. 2,202,958, on August 5, 2017 in accordance with Resolution No. 466 of 2012 of the National Health Council. Older adults included in the study signed an Informed Consent Term after approval by the Ethics Committee.

RESULTS

During the study period, 336 older adults admitted to the health unit were evaluated for eligibility, of whom 235 had cognitive impairment. Of older adults with cognitive impairment, 216 with complete medical records were included in the analysis, of whom 90 (41.7%) reported an average of 1.9 (±1.6) falls in the previous six months (Figure 1).

Most older adults included were female, had a low level of education, were sedentary and overweight (Table 1). There was no significant difference between groups in terms of age, sex, education, cognitive status and previous diagnosis of dementia, nutritional status and level of physical activity, representing homogeneity between the groups for possible confounding variables. The comparison of possible factors associated with falls among older adults with cognitive deficits revealed that those who fell used a greater number of continuous use medications, had a higher frequency of the diagnosis of depression and complaints of visual impairment, body imbalance and insecurity when walking. There was no significant difference for muscle mass and strength, mobility and functional capacity between the two study groups (Table 1).
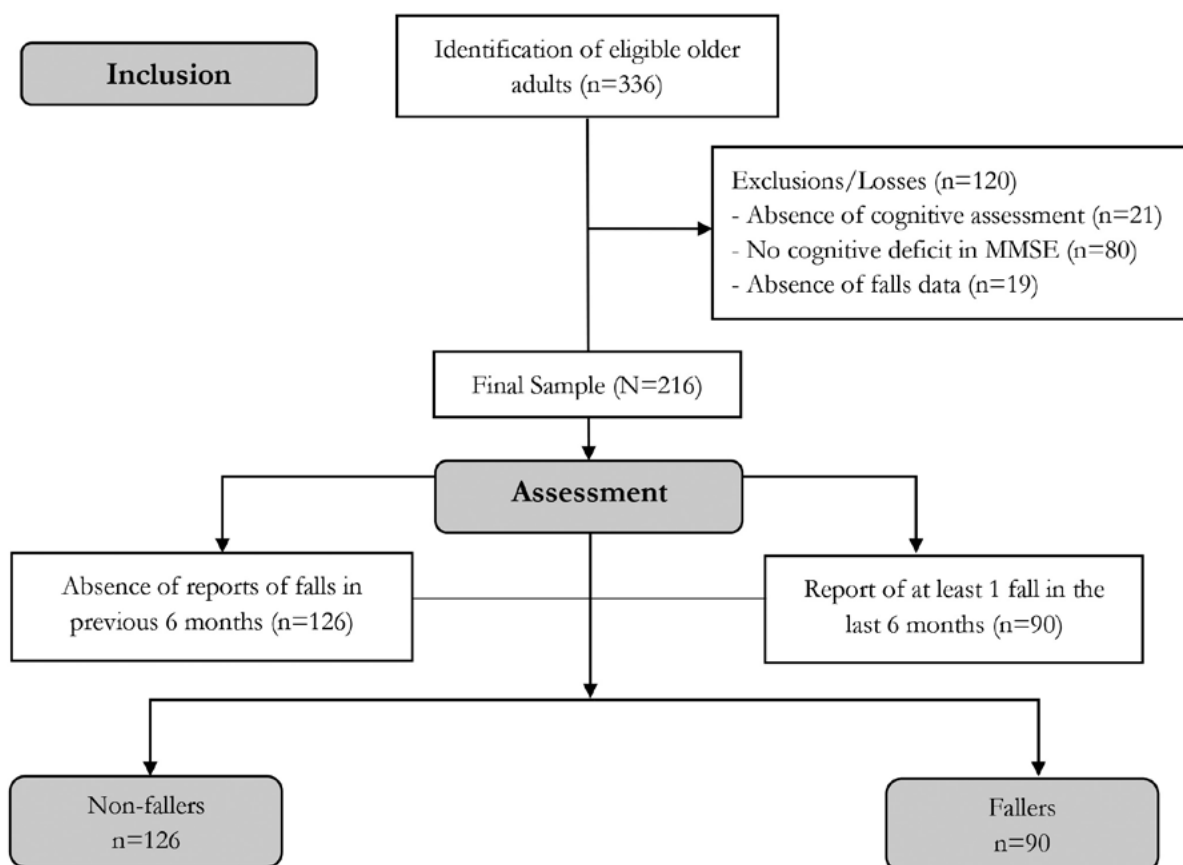

Figure 1. Flowchart of sample selection. Distrito Federal, 2018-2019.

Table 1. Characterization and comparison of sociodemographic, clinical, anthropometric and physical-functional variables among older fallers and non-fallers with cognitive impairment (N=216). Brasília, Distrito Federal, 2018-2019.

Variable	Non-fallers (n=126)	Fallers (n=90)	Mean difference between groups [CI 95%]	p-value
Sociodemographic, clinical and anthropometric characteristics				
Mean age (±sd) [†]	79.0 (±7.2)	77.7 (±7.2)	1.2 [-0.7; 3.2]	0.156
Sex, % (n) [‡]			-	
Female	67.5 (85)	68.9 (62)		0.883
Male	32.5 (41)	31.1 (28)		
Years of study, mean (± SD) [†]	2.3 (±2.5)	2.8 (±3.1)	-0.5 [-1.2; 0.2]	0.339
Average cognitive state (MMSE) (± SD) [†]	14.1 (±5.8)	15.3 (±5.5)	-1.2 [-2.7; 0.4]	0.250
Illiterate	11.1 (±4.7)	12.3 (±3.9)		
1 to 3	14.6 (±5.9)	15.6 (±5.2)		
4 to 7	16.8 (±5.2)	16.1 (±4.6)		
≥ 8	19.7 (±5.5)	22.5 (±5.2)		
Previous diagnosis of dementia (yes),% (n) [‡]	27.9 (34)	24.1 (21)		0.633
BMI, mean (± sd) [†]	26.5 (±4.5)	27.4 (±5.6)	-0.9 [-2.5; 0.7]	0.427
Nutritional status,% (n) [‡]				
Low Weight	14.1 (13)	17.2 (11)	-	0.810
Normal Weight	40.2 (37)	35.9 (23)	-	
Overweight	45.7 (42)	46.9 (30)	-	
Active (yes), %(n) [‡]	8.7 (11)	5.6 (5)	-	0.440
Clinical characteristics				
Pain (yes),% (n) [‡]	57.1 (72)	68.9 (62)	-	0.089
Mental confusion (yes),% (n) [‡]	66.1 (82)	68.9 (62)	-	0.768
Hearing deficit (yes),% (n) [‡]	34.1 (43)	37.8 (34)	-	0.666
Visual impairment (yes),% (n) [‡] [*]	74.6 (94)	87.8 (79)	-	0.024
Incontinence (yes),% (n) [‡]	59.5 (72)	71.6 (63)	-	0.080
Physical tiredness (yes),% (n) [‡]	60.3 (76)	67.8 (61)	-	0.316
Diagnosis of depression (yes),% (n) [‡] [*]	33.3 (42)	48.3 (43)	-	0.034
History of hospitalizations (yes),% (n) [‡]	24.0 (29)	24.7 (21)	-	0.903
Medications (quantity), mean (± sd) [†] [*]	5.4 (±2.8)	6.5 (±3.3)	-1.077 [-1.9; -0.2]	0.027
Polypharmacy (yes),% (n) [‡]	63.1 (77)	69.0 (60)	-	0.461
Physical and functional characteristics				
Muscle weakness (yes),% (n) [‡]	63.5 (80)	76.7 (69)	-	0.052
Dizziness (yes),% (n) [‡]	56.3 (71)	57.8 (52)	-	0.890
Body imbalance (yes),% (n) [‡] [*]	58.4 (73)	80.9 (72)	-	0.001
Insecurity when walking (yes),% (n) [‡] [*]	56.5 (70)	70.5 (62)	-	0.044
Muscle mass (cm), mean (± sd) [†]	34.0 (±4.8)	34.1 (±5.2)	-0.0 [-1.5; 1.4]	0.794
Muscle strength (Kgf), mean (± sd) [†]	19.9 (±8.1)	17.5 (±5.9)	2.5 [-0.3; 5.3]	0.134
Functional capacity (Pfeffer), mean (± sd) [†]	18.6 (±9.7)	18.0 (±9.4)	0.6 [-2.3; 3.5]	0.627
Mobility (SAM-Br), mean (± sd) [†]	15.9 (±3.7)	16.1 (±2.7)	-0.6 [-1.7; 0.4]	**0.250**

[†]Mann Whitney U-Test; [‡]Chi-Squared Test; [*]$p<0.05$ for comparison between fallers and non-fallers.

Table 2 shows the results of the assessment of the influence of each independent variable on the occurrence of falls among the older adults studied. Univariate analysis showed that the presence of complaints of visual impairment, muscle weakness, imbalance and insecurity when walking, the report of a previous diagnosis of depression and a greater number of continuous use medications explained falls in older adults with cognitive deficit. However, in multivariate analysis, only the complaint of visual impairment and body imbalance and the use of more medications remained in the final model as predictors of falls. Although these three variables were shown to be predictors, AUC analysis indicated the poor accuracy of polypharmacy (as an independent factor) to predict falls (Table 3).

Table 2. Univariate and multivariate logistic regression analyzes to verify associations between clinical and physical-functional factors and the history of falls in older adults with cognitive impairment (N=216). Brasília, Distrito Federal, 2018-2019.

Variables	Univariate Analysis		Multivariate	
	OR [95% CI]	*p*-value	OR [95% CI]	*p*-value
Clinical				
Pain	1.7 [0.9; 2.9]	0.081	-	-
Mental confusion	1.1 [0.6; 2.0]	0.671	-	-
Hearing deficiency	1.2 [0.7; 2.0]	0.581	-	-
Visual impairment	2.4 [1.1; 5.2]	0.019**	2.8 [1.2; 6.5]	0.015*
Incontinence	1.7 [0.9; 3.1]	0.072	-	-
Physical tiredness	1.4 [0.8; 2.4]	0.262	-	-
Diagnosis of depression	1.9 [1.1; 3.3]	0.028**	-	-
Hospitalization history (yes)	1.0 [0.5; 1.8]	0.903	-	-
Continuous use medications	1.1 [1.0; 1.2]	0.014**	1.1 [1.0; 1.2]	0.038*
Physical-functional			-	-
Muscle weakness	1.9 [1.0; 3.5]	0.040**	-	-
Dizziness	1.1 [0.6; 1.8]	0.834	-	-
Body imbalance	3.0 [1.6; 5.7]	0.001**	2.7 [1.4; 5.3]	0.004*
Insecurity when walking	1.8 [1.0; 3.3]	0.039**	-	-
Muscle mass (cm)	1.0 [0.9; 1.1]	0.936	-	-
Muscle strength (Kgf)	0.9 [0.9; 1.0]	0.086	-	-
Functional capacity (Pfeffer)	1.0 [1.0; 1.0]	0.672	-	-
Mobility (SAM-Br)	1.1 [0.9; 1.2]	0.249	-	-

Multivariate binary logistic regression with forward stepwise method. The data were expressed in OR [95% CI]; ** *p*<0.05 in the univariate analysis (variables were included in the multivariate regression analysis); **p*<0.05 in multivariate analysis.

Table 3. Capacity of risk factors to predict falls in older adults with cognitive impairment (N=216). Brasília, Distrito Federal, 2018-2019.

	Visual impairment	Polypharmacy	Body imbalance
Cutoff	Yes	≥ 5 medications	Yes
Sensitivity (%)	87.8	68.9	80.9
Specificity (%)	25.4	36.8	41.6
PPV (%)	45.6	43.7	49.6
NPV (%)	74.4	62.5	75.4
AUC [95% CI]	-	0.6 [0.5; 0.7]	-
p-value	-	0.028	-

PPV = Positive Predictive Value; NPV = Negative Predictive Value; AUC = Area under the curve; ROC. CI = Confidence Interval.

DISCUSSION

Older adults with cognitive impairment had a high frequency of falls (41.7%). In these adults, complaints of visual impairment and body imbalance reported by older adults and/or their caregivers and the greater number of continuous use medications were associated with reports of falls, and were therefore predictors of falls, but with poor accuracy. The high frequency of falls observed in the present study reiterates that cognitive deficit represents a greater risk of falls among older adults, when compared to the rates of approximately 30% of fallers among older community members in general[19]. Additionally, it corroborates data from previous studies that observed rates above 60% for the incidence of falls in 6 to 12 months of follow-up among people with cognitive impairment or dementia, explained by the accumulation of associated comorbidities, reduced mobility and physical capacity, and the need for walking aids among these older adults[8,31].

In the present study, older fallers had 2.8 times the chance of older non-fallers to complain of visual impairment, with the perception of visual impairment correctly identifying 87.8% of older fallers, revealing that the assessment of this impairment can make an important contribution in clinical and research settings. The methodology for assessing visual impairment in older adults with cognitive impairment has varied greatly between studies[7,32]. Studies[7,32] that assessed visual status using the Multidimensional Dementia Assessment Scale and Comprehensive Geriatric Assessment did not indicate visual impairment as a risk factor for falls. However, studies that assessed the visual perception of older adults with dementia using the copy item of the two pentagons that intersect in the Mini-Mental State Examination and the report of history of cataracts showed that visual impairment behave as a risk factor for falls in these patients[1,6].

The frequencies of previous diagnosis of depression observed in the present study corroborate rates of approximately 30% of depression and/or depressive symptoms observed in patients with dementia[33]. Previous studies have shown that depressive symptoms in cognitively impaired older adults are associated with falls[1,6,32] while in the sample of the present study, older fallers had 1.9 times the chance of non-fallers to report a previous diagnosis of depression. Despite these findings, this factor was not maintained as a predictor of falls in the multivariate analysis of the present study. It is possible that the use of antidepressant drugs, which was not investigated in the present study, is a better independent predictor of falls than depressive symptoms, as observed by Whitney et al.[34].

Older adults who fell used on average one more continuous use medication than those who did not fall, with polypharmacy correctly identifying 68.9% of older adults who fell in the present study. The use of multiple medications has been consistently associated with a history of falls in older adults with and without cognitive impairment and/or dementia[10]. Previous studies have shown that drugs that act on the central nervous system, such as antipsychotics, anxiolytics, benzodiazepines, hypnotics, sedatives and antidepressants, increase the risk of falling in cognitively impaired older adults[1,6,34]. However, regardless of the class of drug, it is reiterated that polypharmacy requires special attention in screening, as it seems to increase the likelihood of falling among cognitively impaired older adults[6,32,34].

In the present study, muscle weakness was a highly frequent complaint in older fallers and non-fallers, accompanied by a high rate of physical inactivity and similar indicators of muscle mass and HGS in both groups of older adults. In univariate analysis, older adults who fell had 1.9 times the chance of older adults who did not fall to complain of muscle weakness, although this factor was not maintained as a predictor of falls in multivariate analysis. Previous studies have shown inconsistent results in relation to indicating muscle weakness as a risk factor for falls among cognitively impaired older adults[8,10,34]. It is also possible that the complaint of muscle weakness investigated in the present study reveals other physical-functional and personal aspects that go beyond the components of muscle mass and strength.

Older adult fallers complained 22.5% more about body imbalance than non-fallers and had 2.7 times the chance of non-fallers to describe the perception of this condition during intake. Additionally, the complaint of body imbalance correctly identified

80.9% of fallers, signaling the importance of continuing this line of investigation in order to improve the early identification of the risk of falling among older adults with cognitive impairment using this question. In previous studies, the decline in body balance in older adults with cognitive impairment was identified by means of stabilometric posturography variables[12,35], and these deficiencies in body balance were shown to be associated with an increased risk of falls in older adults with cognitive impairment and dementia[6,8,34]. However, despite these significant associations, simple balance assessment tests, such as Romberg and the Timed Get Up and Go, revealed lower estimates of accuracy for recognizing the risk of falls in older adults with cognitive impairment than those identified in the present study through the complaint of body imbalance[36].

Excess worry and anxiety about walking was more frequent among older adults who fell, but not enough to maintain the complaint of insecurity when walking as a predictor of falls in the older adults in the study. Despite the high frequency of insecurity when walking observed in the groups, older adults did not present significant mobility limitations when assessed by SAM-Br. Previous findings indicate that it is precisely changes in gait and mobility that are associated with an increased risk of falling in older adults with cognitive impairment and dementia[7,11,31,34]. However, these changes in gait can be subtle in the early stages of dementia, and do not justify the increased occurrence of falls alone[1].

The present study investigated several possible risk factors for falls among older adults with cognitive deficits, using mostly simple questions about the perception of signs and/or symptoms, in addition to rapid application tools validated for this older profile. The analyzes were performed in a sample size suggested by *a priori* calculation. The reporting of previous falls was restricted to the previous six months in order to reduce recall bias. However, despite these strengths, the heterogeneity of the severity of cognitive deficits and the different pathophysiological mechanisms included may have influenced the findings. In addition, the cross-sectional design of the study does not allow a causal relationship of the investigated risk factors and the occurrence of falls to be established.

CONCLUSION

According to the results of this study, a high frequency of falls was identified among cognitively impaired older adults and it was found that polypharmacy and the perception of visual impairment and body imbalance by older adults or their caregivers are factors associated with falls, although with poor accuracy. These findings inform care teams of cognitively impaired older adults that the inclusion of these simple, quick questions in the clinical routine and in research can contribute to screening the risk of falling in this population and favor early intervention in modifiable factors.

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