

# ANALYSIS OF THE RISK OF FALLS IN ELDERLY PEOPLE WITH COGNITIVE IMPAIRMENT

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## ABSTRACT

With advances in medicine, there has been a reduction in premature mortality, leading to an increase in the world's elderly population. Thus, it is known that aging brings about various deficits, making it necessary to take measures to improve quality of life, even with these changes present. Therefore, this study aims to evaluate the relationship between lower limb muscle strength (FM MMII), postural balance, and the occurrence of falls in elderly people with cognitive deficits. The study population consisted of 106 elderly individuals regularly enrolled at UniAPI, of whom only 60 met the inclusion criteria, among whom 34 elderly individuals had a lower score on the Mini Mental State Examination, presenting a reduction in cognitive level. Falls were observed through reports of falls in the last 12 months, while muscle strength was assessed using the sit-to-stand test and balance was assessed using a force platform using a variable from the Sway protocol. The study showed no relationship between cognitive level and the variables falls ( $p=0.865$ ), balance ( $p=0.970$  and  $p=0.882$ ), and sit-to-stand test (muscle strength of lower limbs) ( $p=0.735$ ), which were not statistically significant. However, further studies are needed, as this research was conducted in physically active older adults and the relationship between cognitive status and other variables may be altered in less active older adults.

**Keywords:** Frail elderly; Postural balance; Cognitive dysfunction; Muscle strength.

## INTRODUCTION

According to the 2022 demographic census, Brazil reached 31.2 million people over the age of 60, which shows a 39.8% increase in the number of elderly people compared to 2012 (IBGE). This increase in the elderly population is due to advances in medicine, which have led to a reduction in premature mortality (SILVA *et al.*, 2021).

The appearance of deficits with aging is undeniable, compromising the proper functioning of the body's organs and systems, causing damage to body balance and the maintenance of the upright position (CAIXETA; FERREIRA, 2019). These also present as cognitive impairment, which involves their social behavior, their ability to learn and memorize, the execution of tasks, and complex attention (BARROS *et al.*, 2023).

Thus, changes in cognitive level directly affect the functionality of older adults (CRUZ *et al.*, 2015). According to a study by Barros (2023), older adults with cognitive decline had a higher incidence of falls. Thus, manifestations of imbalance are very harmful to quality of life. In addition to the physical trauma that falls can cause, they can lead to a fear of falling, which will cause the person to reduce their activities (CAIXETA; FERREIRA, 2019).

Therefore, greater knowledge about how aging affects cognition and balance in this population is of great value. Given that the elderly population is growing and aiming for an improved quality of life in older ages, this study aims to evaluate the relationship between lower limb strength, postural balance, and the occurrence of falls in elderly people with cognitive impairment.

## **METHODOLOGY**

A cross-sectional analytical observational study was conducted with UniAPI classes in March 2024. The study population consisted of 106 elderly people regularly enrolled at UniAPI, of whom only 60 met the inclusion and exclusion criteria: elderly people aged 60 years or older, of both sexes, who agreed to participate in the study, of whom 34 elderly people had reduced cognitive levels. Elderly individuals with lower limb amputations above the metatarsophalangeal and metacarpophalangeal joints, respectively, were excluded from the study, as were those using lower limb and upper limb prostheses and those unable to walk independently, stand, or move around exclusively by wheelchair.

Sociodemographic information was collected and assessments were made on the incidence of falls, cognitive level, muscle strength, and static balance. The Mini Mental State Examination (MMSE) was used, which contains questions about recent and immediate memory, temporal and spatial orientation, attention, calculation, and language (MS, 2006). For the physical exam, the choice was the Sit-to-stand Test, which consists of the participant standing up and sitting down as many times as possible in 30 seconds without the aid of their upper limbs (RIKLI; JONES, 1999). Similarly, for balance, a variation of the Sway protocol was used on a force platform, on which a layer of foam was placed, and the participant remained in an upright

position with their feet parallel and 10 cm apart, with their eyes open, and remained like this for 30 seconds (PARREIRA *et al.*, 2022).

## RESULTS AND DISCUSSION

The results point to a heterogeneous sample in terms of gender and age group. The average age of the participants was 68.9 years, with a minimum of 60 years and a maximum of 88 years. Married elderly people predominated (n=22; 36.6%), followed by widows (n=19; 31.7%) and those with more than 7 years of schooling (n=40; 66.7%).

In this sample, it was observed that elderly people with preserved cognition (n=26) and those with cognitive impairment (n=34) did not report falls in the last 12 months (73.1% and 67.6%, respectively).

Table 1 shows that there was no significant association between those with preserved cognition and those without preserved cognition and falls in the last 12 months,  $\chi^2_{(1, n=60)} = .03$ ,  $p = .86$ ,  $\phi = -.06$ .

**Table 1:** Relationship between cognitive function and the number of falls in the last twelve months.

Cognitive	Falls		p
	Yes	No	
Yes	7	19 (73.1)	0.865
No	11 (32.4)	23	

Source: Data expressed in absolute numbers (percentages). The Chi-square test was used to compare continuous data.

Corroborating the results of this study, Hamdan, Schmitt, and Vogel (2024) evaluated the cognitive level of elderly individuals using the MEEM and found no statistically significant relationship between the level of cognitive impairment and the incidence and severity of falls in this population.

Table 2 shows the relationship between cognitive function and the sit-to-stand test, which the independent t-test showed that there is no significant difference in the sit-to-stand test for elderly individuals with preserved cognitive function ( $M = 10.08 \pm 3.1$ ) and those with cognitive impairment ( $M = 9.79 \pm 3.2$ ;  $t_{(58)} = 0.340$ ,  $p = .73$ ). This

result contradicts the findings of Dias *et al.* (2024), who found the sit-to-stand test to be a moderately effective means of predicting cognitive impairment in older adults.

**Table 2:** Relationship between cognitive function and the sit-to-stand test.

	Cognitive	N (mean)	Standard	p
Sitting and standing up	Yes	26	3.174 (0.622)	0.735
	No	34	3.208	

Source: Data expressed in absolute numbers (mean), standard deviation (standard error). The Chi-square test was used to compare continuous data.

Table 3 shows the relationship between cognition and postural control and speed (TOTAL COP and COP VEL) on the force platform, which demonstrated that the cognitive status of older adults does not influence balance, i.e., there was no difference between elderly individuals with preserved cognition and those with impaired cognition in terms of both total COP displacement and COP speed ( $t(58) = -.038, p = .97$ ;  $t(58) = -.149, p = .9$ ) in our study. This result is in agreement with the study by Castilho *et al.* (2018), which demonstrated that there was no change in body balance when comparing changes in cognitive status.

**Table 3:** Relationship between cognitive function and TOTAL COP and COP VEL on the force platform.

	Cognitive	N	Standard deviation (standard error)	p
COP TOTAL	Yes	2	84.63 (16.59)	0.970
	No	34	90.62 (15.54)	
COP VEL	Yes	26	2.82 (0.554)	0.882
	No	34 (11.21)	3.13 (0.537)	

Source: Data expressed in absolute numbers (percentages), standard deviation (standard error). The Chi-square test was used to compare continuous data.

## CONCLUSION

According to the results presented in this study, there was no relationship between cognitive level and the variables of falls, balance, and lower limb muscle strength. However, further studies are needed, since this study was conducted in

physically active older adults and the relationship between cognitive status and the other variables may be altered in less active older adults.

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## **BIBLIOGRAPHICAL REFERENCES**

DOS SANTOS SILVA, A. *et al.* Population aging: current reality and challenges. **Global Academic Nursing Journal**, 2021. v. 2, p. e188.

CRISTINA DOS SANTOS CAIXETA, G.; FERREIRA, A. Cognitive performance and functional balance in the elderly. **Revista Neurociências**, 2019. v. 17, n. 3, p. 202-208.

MAIA ATALLAH HAUN DE BARROS, M. *et al.* Cognitive impairment and associated factors in an elderly population. **Cadernos Saúde Coletiva**, 2023. v. 31.

TELES DA CRUZ, D. *et al.* Association between cognitive ability and the occurrence of falls in older adults. **Cadernos Saúde Coletiva**, 2015. v. 23, n. 4, p. 386–393.

Rikli RE, Jones CJ. Development and validation of a functional fitness test for community-residing older adults. 2nd ed. **Journal of Aging and Physical Activity**, 1999. V. 7, p. 129-61.

AGING AND HEALTH OF THE ELDERLY. Cadernos de Atenção Básica (Primary Care Notebooks) - no. 19, **MINISTRY OF HEALTH**. Brasília - DF, 2006.

HAMDAN LB, SCHMITT É, VOGEL T. Association between the severity of neurocognitive disorders and the severity of falls in older adults. **Geriatrics and Neuropsychiatry of Aging**, 2024. v. 22, n. 1, p.42-48.

REGO CHAVES DIAS, C. *et al.* INDICATORS OF FUNCTIONAL FITNESS AND COGNITIVE COMMITMENT IN ELDERLY. **Brazilian Journal of Sports Medicine**, 2024. v. 30.

DA ROSA CASTILHO, A. *et al.* Influence of Cognitive Mental State on Postural Balance in Elderly People. **Journal of Health Sciences**, 2018. v. 20, n. 3, p. 190-194.

BORGES PARREIRA R. *et al.* Effects of the Interference of Sensory Systems on Postural Control in Congenitally Blind Subjects. **Journal of Motor Behavior**, 2022. v. 55, n. 3, p. 237-244.