

POSTURAL BALANCE, MUSCLE STRENGTH, AND RISK OF FALLS IN ELDERLY PEOPLE WITH CHRONIC OSTEOMYARTHROTIC DISEASE

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ABSTRACT

Longevity brings new challenges that demonstrate the importance of healthy aging and the inclusion of older adults in society. However, many older adults find it difficult to maintain their ability to move independently and safely, and thus, restricted mobility can lead to several undesirable consequences, such as an increased risk of falls and loss of independence. Thus, the objective of this study is to investigate the relationship between lower limb muscle strength, postural balance, and the risk of falls in older adults with osteoarticular diseases. This is a cross-sectional, observational, analytical study. The study population consisted of 106 elderly individuals regularly enrolled at UniAPI, of whom only 60 met the inclusion criteria. Sociodemographic information was collected, and assessments were made on the incidence of falls, muscle strength, and static balance. In addition, the sit-to-stand test was used to assess lower limb muscle strength, and the Sway protocol on a force platform was used to assess static balance. The study showed that those without knee osteoarthritis performed more repetitions in the sit-to-stand test than those with osteoarthritis, concluding that the risk of falls in older adults with osteoarthritis is a worrying factor that should be addressed through preventive measures aimed at improving body instability.

Keywords: Elderly; Fall accidents; Postural balance; Osteoarthritis;

INTRODUCTION

Population aging is on the rise globally, with a 57.4% increase in the number of older adults in Brazil since 2010. Longevity brings new challenges, highlighting the importance of healthy aging and social inclusion of older adults. Restricted mobility can result in risks such as falls and loss of independence, highlighting the need to ensure the autonomy and safety of older adults. (SCOTT, 2021, MITCHELL; WALKER, 2020, LIMA *et al.*, 2022).

Thus, along with senility, several changes occur in the osteoarticular system, including loss of mineral density, reduction in muscle mass, and joint degeneration. This increases the risk of developing osteomyoarticular diseases, such as osteoporosis, osteoarthritis, and other disabling diseases, which result in chronic pain, limited movement, and functional disability (FECHINE; TROMPIERI, 2012, PREVIATO *et al.*, 2021).

The risk of falls in older adults is influenced by reduced muscle strength and loss of balance (DUARTE *et al.*, 2019), and is even higher in older adults with osteoarticular diseases. This can lead to fractures and loss of autonomy, negatively impacting quality of life (TOLEDO; BARRETO; MAGNANI, 2018, PAIVA; LIMA; BARROS, 2021).

The relevance of this research lies in identifying potential risk factors for loss of balance, as well as providing valuable *insights* for the development of more effective interventions. Thus, the objective of this study is to investigate the relationship between lower limb muscle strength, postural balance, and the risk of falls in older adults with osteoarticular diseases.

METHODOLOGY

A cross-sectional analytical observational study was conducted with elderly participants at UniAPI, in the UniEVANGÉLICA Water Park, in March 2024. The study population consisted of 106 elderly individuals regularly enrolled at UniAPI, of whom only 60 met the inclusion and exclusion criteria: elderly individuals aged 60 years or older, of both sexes, who agreed to participate in the study. 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 and who were exclusively wheelchair-bound. Sociodemographic information, assessments of the incidence of falls and cognitive level, and physical tests of lower limb muscle strength (sitting/standing) and static balance were collected. The sit-to-stand test consists of the participant standing up and sitting down from a chair as many times as possible in 30 seconds, without the aid of the upper limbs (RIKLI; JONES, 1999). For static balance, a variation of the Sway protocol was used on a force platform, which consists of standing in an upright position with feet parallel and 10 cm apart, with eyes open, and remaining in this position for 30 seconds on a foam layer on the platform (PARREIRA, 2022).

RESULTS AND DISCUSSION

The results indicate a heterogeneous sample in terms of gender and age group. The average age of participants was 68.9 years, with a minimum age of 60 and a maximum age of 88. Married elderly individuals predominated (n=22; 36.6%), followed

by widowed individuals (n=19; 31.7%) and those with more than seven years of schooling (n=40; 66.7%). Table 1 shows the relationship between lower limb strength (LLS) and risk of falls in elderly people with osteoarticular diseases.

Table 1 - Relationship between lower limb strength and risk of falls in elderly people with osteoarticular diseases

	Osteoarticular disease	N (average)	Standard deviation	p
Sitting Standing	Yes	29	2.923 (0.543)	0.005
	No	31 (11.00)	3.044 (0.547)	

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

The independent T-test showed a significant difference in the sit-to-stand test for those with osteoarticular disease ($M = 8.76 \pm 3$) compared to those without ($M = 11 \pm 3$; $t(58) = 2.905$, $p = .005$).

Table 1 shows that older adults without osteomyoarticular diseases perform more repetitions in the sit-to-stand test than those with osteomyoarticular diseases. This sit-to-stand movement is used as an indicator of functional capacity, as it is one of the most common actions in daily life, regardless of the type of pathology. In this case, older adults without osteomyoarticular diseases performed better in the test. According to Melo et al., (, 2018), this tool can complement other resources to identify ambulatory capacity, risk of falls, and recovery of functional independence in this type of condition.

Table 2 - Relationship between age and static balance

COP VEL	AGE	N	Mean (SD)	P
	≤ 66	2	11.18 (3.32)	0.203
	67	1	10.28 (2.98)	
	+ 73	19	12.01 (2.41)	

Data expressed as mean (standard deviation). The ANOVA test was used to compare the groups.

A one-factor ANOVA test was conducted to explore the impact of age on static balance measured using the force platform. The elderly were divided into three age groups: Group 1 - ≤ 66 years; 67-72 years; >73 years. For total COP displacement, no statistical difference was observed ($F(2, 57) = 1.011$, $p = .37$).

between the groups (Group 1: $M = 332.46 \pm 102$; Group 2: $M = 301.1 \pm 71.1$; Group 3: $M = 338.3 \pm 82.3$), as well as for COP velocity ($F(2, 57) = 1.638$, $p = .2$; Group 1: $M = 11.18 \pm 3$; Group 2: $M = 10.28 \pm 3$; Group 3: $M = 12.01 \pm 2.4$).

Contradicting our results, Table 2 showed that advanced age did not influence static balance, while the study by Ferreira et al. (2019) demonstrates that body balance in older adults is more compromised with age, a greater number of diseases, more falls, poorer gait performance, decreased lower limb strength and mobility, presence of stroke and musculoskeletal diseases, complaints of pain, use of walking aids, fear of falling, and lack of physical activity.

CONCLUSION

In this study, older adults with osteoarticular disease in the lower limbs performed worse on the sit-to-stand test. This deterioration reflects a reduction in lower limb muscle strength, consequently influencing postural balance and contributing to an increased risk of falls.

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