

RISK OF FALLS, LOWER LIMB MUSCLE STRENGTH, AND POSTURAL BALANCE IN ELDERLY PEOPLE WITH AND WITHOUT ARTERIAL HYPERTENSION.

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ABSTRACT

Global population aging poses significant challenges to public health, especially with regard to the increased risk of falls among older adults, which can be exacerbated by conditions such as hypertension. These factors are associated with health problems that can lead to serious accidents, loss of autonomy, and reduced quality of life for older adults. The objective of this study was to compare the risk of falls, lower limb muscle strength, and postural balance in older adults with and without hypertension. A cross-sectional analytical observational study was conducted with 106 older adults enrolled at UniAPI, of whom 10 met the inclusion criteria. Sociodemographic information was collected, and assessments of fall risk, cognitive level, and muscle strength were performed. The results showed that hypertensive elderly individuals performed significantly worse on the Sit-to-Stand Test (STT) compared to healthy individuals, reflecting reduced functional capacity. However, no significant differences in postural balance were found between elderly individuals with and without hypertension, as indicated by the values of displacement and speed of the center of gravity. These findings indicate that when hypertension is controlled, there is no impact on postural balance control. The absence of significant differences reinforces the need for intervention strategies to improve mobility and muscle strength in patients with cardiovascular conditions, aiming to prevent falls and improve the quality of life of older adults.

Keywords: Hypertension; Elderly; Postural Balance; Risk of Falls.

INTRODUCTION

Population aging is a phenomenon that is becoming more common worldwide and presents several important problems for public health (VERAS, 2018). One of the most worrying problems is the increased risk of falls in the elderly, especially those with hypertension and cardiovascular diseases, resulting in health problems that increase the risk of serious accidents and compromise the physical capacity and autonomy of the elderly (PAIVA, 2021).

Hypertension is a common condition in the elderly population and is often associated with several complications that can affect mobility and balance (DENFELD, 2022). The risk of falls increases as a result of the interaction between the natural aging of the body and the limitations imposed by these diseases. These falls can result in fractures, prolonged hospitalization, loss of autonomy, and, in extreme cases, death (XU, 2022).

In addition to physical damage, the constant worry about falling can cause elderly people to reduce their daily activities, which results in a cycle of inactivity that further aggravates their cardiovascular and hypertensive conditions (DROGA, 2022).

To develop prevention strategies and promote healthy aging, it is necessary to understand the factors that increase the risk of falls in older adults with these diseases (IZQUIERDO, 2021).

Through an observational, cross-sectional study, we seek to highlight the importance of fall prevention and identify factors that may be contributing to the increase in falls, with a view to improving the quality of life of older adults. By providing a detailed overview of this topic, we hope to contribute to awareness and the implementation of effective preventive measures in the healthcare of the elderly population. Given these facts, the objective of this study is to compare lower limb muscle strength (LMS) and postural balance in elderly people with hypertension.

METHODOLOGY

This was a cross-sectional observational study conducted with elderly participants at UniAPI in March 2024. The study population consisted of 106 elderly people regularly enrolled at UniAPI, of whom only 60 were included in the study. Of these, 10 were eligible and diagnosed with hypertension.

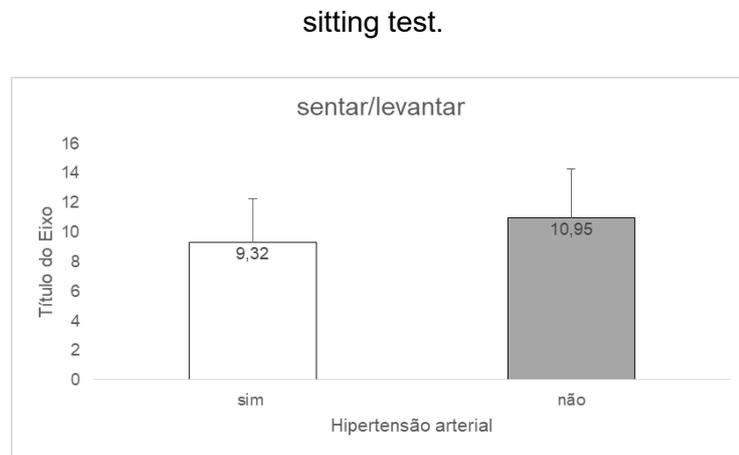
Sociodemographic and health information was collected, along with physical tests on fall risk, cognitive level, and muscle strength. Fall risk was assessed using a specific questionnaire and the Timed Up and Go (TUG) test. A shorter time on the test indicates better performance. (ANDRADE, 2021). The Sit-to-Stand Test was also performed to analyze lower limb muscle strength. Postural balance was assessed on a force platform using a variation of the Sway protocol, in which a layer of foam is placed on the platform and the participant stands in an upright position with their feet parallel and 10 cm apart, with their eyes open, and remains in this position for 30 seconds.

RESULTS AND DISCUSSION

The results indicate a heterogeneous sample in relation to the variables of gender and age group. The average age of the participants was 68.9 years, with a minimum age of 60 years and a maximum age of 88 years. Married elderly

individuals predominated (n=22; 36.6%), followed by widowed individuals (n=19; 31.7%) and those with more than 7 years of schooling (n=40; 66.7%).

Graph 1: Comparison between elderly people with and without hypertension using the stand-up test



Source: Own work

Graph 1 shows that individuals with hypertension (HTN) perform significantly worse on the Sit-to-Stand Test (STT) compared to elderly individuals without hypertension.

The independent T-test analysis revealed a significant difference between the two groups: individuals with AH had an average of 9.32 repetitions \pm 3, while those without AH performed an average of 10.95 repetitions \pm 3, with a t-value (58) = 1.977 and $p = 0.05$, resulting in a medium effect size ($r = 0.53$). This suggests that people without hypertension have better functional capacity compared to those with AH.

This result is consistent with Santos et al. (2021), who conducted a study with hypertensive elderly individuals and observed that increased blood pressure affects their ability to perform basic activities independently. This results in a decrease in functional capacity, especially when associated with other comorbidities and lifestyle habits.

Table 1 showed no difference between elderly individuals with or without hypertension and balance, as evidenced by both total COP displacement ($t(58) = 0.741$, $p = 0.46$) and COP velocity ($t(58) = 0.266$, $p = 0.76$).

Table 1: Risk of falls in elderly individuals with hypertension, using the Sway protocol (force platform) and TUG execution time

Hypertension	N	Standard deviation	p
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			(standard error)	
TOTAL COP	Yes	3	72.96	0.462
	No	2	108.88 (23.21)	
COP VEL	Yes	38	2.26 (0.36)	0.760
	No	22 (11.00)	3.99 (0.85)	

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

These findings corroborate the study by Acar et al. (2015), which demonstrated that elderly individuals with controlled hypertension do not experience changes in postural balance, regardless of the sensory conditions tested. The lack of significant differences in the parameters of displacement and speed of the center of gravity indicates that hypertension, when well controlled, does not affect balance control.

CONCLUSION

This study demonstrates that, although elderly individuals with hypertension show reduced functional performance in specific tests, such as the Sit-to-Stand Test (TSL1), there was no significant difference in postural balance between elderly individuals with and without hypertension when it is well controlled.

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BIBLIOGRAPHICAL REFERENCES

ACAR, S., et al. Is hypertension a risk factor for poor balance control in elderly adults? **J Phys Ther Sci**. 2015.

ANDRADE, et al. Timed Up and Go test in the assessment of fall risk in the elderly: a literature review. **Research, Society and Development**, v. 10, n. 13, 2021

DENFELD, Quin E., et al. Preventing and Managing Falls in Adults With Cardiovascular Disease: A Scientific Statement From the American Heart Association. **Circulation: Cardiovascular Quality and Outcomes**, v. 15, n. 6, e000108, 2022.

DOGRA, Shilpa, et al. Active Aging and Public Health: Evidence, Implications, and Opportunities. **Annual Review of Public Health**, v. 43, p. 439-459, 2022.

IZQUIERDO, et al. International Exercise Recommendations in Older Adults (ICFSR): Expert Consensus Guidelines. **The Journal of Nutrition, Health & Aging**, v. 25, n. 7, p. 824-853, 2021.

OLIVEIRA, M., VERAS, PEIXOTO R.. Aging in Brazil: the building of a healthcare model. Envelhecer no Brasil: a construção de um modelo de cuidado. **Ciência & Saúde Coletiva**, v. 23, n. 6, p. 1929-1936, 2018.

PAIVA MAPELLI M. de, et al. Falls and health-related quality of life in older adults: influence of the type, frequency, and location of falls. **Ciência & Saúde Coletiva**, v. 26, suppl. 3, p. 5099-5108, Nov. 15, 2021.

PARREIRA, Rodolfo B., Jamily Gomes da Silva, Maiquilaine da Mata Nascimento, Manuela Galli & Claudia Santos Oliveira. Effects of the Interference of Sensory Systems on Postural Control in Congenitally Blind Subjects. **Journal of Motor Behavior**, 2022.

PEREIRA, Monica C., et al. One minute sit-to-stand test as an alternative to measure functional capacity in patients with pulmonary arterial hypertension. **Brazilian Journal of Pulmonology**, v. 48, no. 3, 2022.

RIKLI, R.E., & JONES, C.J. Development and validation of a functional fitness test for community-residing older adults. **Journal of Aging and Physical Activity**, v. 7, n. 2, p. 129–161, 1999.

SANTOS, Cynthia C.C., et al. Analysis of cognitive function and functional capacity in hypertensive elderly people. **Brazilian Journal of Geriatrics and Gerontology**, V 14, N 2, 2011

XU, Qingmei, et al. The risk of falls among the aging population: A systematic review and meta-analysis. **Frontiers in Public Health**, v. 10, 902599, Oct. 17, 2022.