RESISTANCE TRAINING IMPROVES PULMONARY FUNCTION, RESPIRATORY AND PERIPHERAL MUSCLE STRENGTH, AND PULMONARY IMMUNOLOGICAL RESPONSE IN HEALTHY ADULTS

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SUMMARY

Global population aging brings significant challenges to public health, especially regarding the increased risk of falls among the elderly, 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 a reduction in the quality of life for the elderly. The objective of this study was to compare the risk of falls, lower limb muscle strength, and postural balance in elderly individuals with and without hypertension. An analytical cross-sectional observational study was conducted with 106 elderly individuals enrolled at UniAPI, of which 10 met the inclusion criteria. Sociodemographic information was collected and assessments of fall risk, cognitive level, and muscle strength were conducted. The results showed that hypertensive elderly individuals performed significantly worse on the Sit-to-Stand Test (SST) compared to healthy individuals, reflecting reduced functional capacity. However, no significant differences were found in postural balance between elderly individuals with and without hypertension, as indicated by the values of center of gravity displacement and velocity. 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 the mobility and muscle strength of patients with cardiovascular conditions, aiming at fall prevention and the improvement of the quality of life of the elderly.

Keywords: Hypertension; Elderly; Postural Balance; Fall Risk.

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Introduction

Population aging is a phenomenon that is becoming more common worldwide and presents several important public health issues (VERAS, 2018). One of the most concerning problems is the increased risk of falls in the elderly, especially those with hypertension and cardiovascular diseases, leading to health issues 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 various 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 of falls can lead the elderly to reduce their daily activities, resulting in a cycle of inactivity that further exacerbates 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 elderly people with these diseases (IZQUIERDO, 2021).

Through an analytical observational cross-sectional study, the aim is to highlight the importance of fall prevention and identify factors that may be contributing to the increase in falls, with the goal of improving the quality of life for the elderly. By providing a detailed view on this topic, it is expected to contribute to raising awareness and implementing effective preventive measures in the care of the elderly population's health. Given these facts, the objective of this study is to compare the muscle strength of the lower limbs (LL) and postural balance in elderly individuals with hypertension.

Methodology

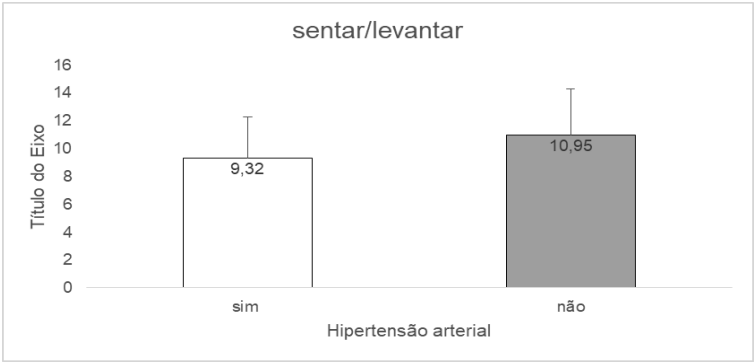
Cross-sectional analytical observational study conducted with elderly participants from UniAPI in March 2024. The study population consisted of 106 elderly individuals regularly enrolled at UniAPI, of which only 60 were included in the study; among these, 10 were eligible and diagnosed with arterial hypertension.

Sociodemographic, health, and physical test information on fall risk, cognitive level, and muscle strength were collected. The risk of falls was assessed through 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 conducted to analyze lower limb muscle strength. Postural balance was assessed on the force platform, using a variation of the Sway protocol, where a layer of foam is placed on the platform and the participant stands in an orthostatic position with their feet parallel and 10 cm apart, with their eyes open, and remains in this position for 30 seconds.

Results

The results indicate a heterogeneous sample in relation to the variables of sex 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 predominated (n=22; 36.6%), followed by widowed (n=19; 31.7%) and those with more than 7 years of schooling (n=40; 66.7%).

Gráfico 1: Comparação entre idosos com e sem hipertensão com o teste de levantar e sentar.



Source: Author's own work

Graph 1 indicates that individuals with hypertension (HT) perform significantly worse on the Sit-to-Stand Test (SST) compared to elderly individuals without hypertension.

The analysis of the Independent T-Test revealed a significant difference between the two groups: individuals with hypertension (HT) had an average of 9.32 repetitions ± 3, while those without hypertension performed an average of 10.95 repetitions ± 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 hypertension.

This result aligns with Santos et al. (2021), who conducted a study with hypertensive elderly individuals and observed that the increase in 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 evidenced both for the total COP displacement (t(58) = 0.741, p = 0.46) and for the COP velocity (t(58) = 0.266, p = 0.76).

Table 1: Fall risk in elderly individuals with hypertension, through the Sway protocol (force platform) and TUG execution time

	Hypertension	N (%)	Standard Deviation (standard error)	p
COP TOTAL	Yes	38 (330)	72,96 (11,83)	0,462
	No	22 (313)	108,88 (23,21)	
COP VEL	Yes	38 (11,25)	2,26 (0,36)	0,760
	Não	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 the continuous data. (percentages), standard deviation (standard error). The Chi-square test was used to compare the continuous data.

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

Conclusion

This study demonstrates that, despite elderly individuals with hypertension showing reduced functional performance in specific tests, such as the Sit-to-Stand Test (SST1), there was no significant difference in postural balance between elderly individuals without and with hypertension when it is well controlled.

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