

CALF CIRCUMFERENCE, LONGITUDINAL CHANGES, AND HEALTH OUTCOMES AMONG COMMUNITY-DWELLING OLDER ADULTS FROM SOUTHERN BRAZIL

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1. INTRODUCTION

The global aging population, driven by declining mortality and fertility rates alongside longer life expectancy, is a significant public health challenge. By 2050, older adults are projected to number 2.1 billion, with those aged 80 and above tripling to 426 million (United Nations, 2022).

This demographic shift is especially rapid in low- and middleincome countries (LMICs) like Brazil, where the elderly population is expected to rise from 7% in 2010 to 24% by 2030 (IBGE, 2022). CC correlates with muscle mass and function, and lower CC has been linked to higher mortality and functional decline. This study aims to explore the association between CC changes and health outcomes among older adults in Southern Brazil.

2.METHODOLOGY

2.1 DESIGN, AND SAMPLE, AND DATA COLLECTION

This longitudinal study used data from the "COMO VAI?" study, initiated in 2014 in Pelotas, Brazil. It involved community-dwelling adults aged 60 and above, excluding institutionalized individuals and those with severe disabilities. Sampling was done in two stages, selecting households from 133 census tracts, aiming for a sample of 1,700 older adults.

2.2 DEFINITION OF THE EXPOSURE (CALF CIRCUMFERENCE)

The main exposure in this study was calf circumference (CC), measured at baseline in 2014 and follow-up in 2019. Trained interviewers took two measurements of each calf using a standardized tape, following Lohman's guidelines. The average of the right calf measurements was used for analysis. A low CC was defined as ≤ 34 cm for men and ≤ 33 cm for women, based on Barbosa-Silva et al. (2016). Changes in CC from 2014 to 2019 were categorized into three groups: stability (less than 5% change), decrease ($\geq 5\%$ reduction), and increase ($\geq 5\%$ growth).

The study outcomes included functional disability (measured by the Katz Index), falls (self-reported over the past year), and frailty. Confounding factors included age, sex, education, lifestyle factors (physical activity, smoking, alcohol use), and multimorbidity (having five or more diseases).

Statistical analyses used ANOVA to assess CC differences across socioeconomic, demographic, and health characteristics in 2014 and 2019.

3. RESULTS AND DISCUSSIONS

Out of 1,451 older adults initially followed, 498 with complete calf circumference data from 2014 and 2019 were analyzed. Most were women (66.3%), white, aged 60-69, married, and had up to 8 years of education.

A decrease in calf circumference was linked to a higher prevalence of functional disability (1.54 times) and frailty (over 100% higher), even after adjusting for confounders. Those with a decrease had 1.80 times higher functional disability and 2.47 times higher frailty compared to those without changes.

Tabela- Crude and adjusted association between calf circumference changes and health-related outcomes in older adults. (Pelotas, Brazil, N = 498)

Calf circumference changes (2014-2019)	Functional disability	
	Crude model PR (95%CI)	Adjusted model† PR (95%CI)
<i>p-value</i>	<i><0.001</i>	<i>0.018</i>
Stability	1.00	1.00
Decrease (<5%)	1.80 (1.39; 2.34)	1.54 (1.14; 2.07)
Increase (>5%)	1.10 (0.75; 1.61)	1.13 (0.80; 1.59)

Calf circumference changes (2014-2019)	Falls	
	Crude model PR (95%CI)	Adjusted model PR (95%CI)
<i>p-value</i>	<i>0.634</i>	<i>0.318</i>
Stability	1.00	1.00
Decrease (<5%)	1.22 (0.81; 1.83)	1.34 (0.89; 2.01)
Increase (>5%)	1.01 (0.64; 1.61)	0.93 (0.60; 1.43)

Calf circumference changes (2014-2019)	Frailty	
	Crude model PR (95%CI)	Adjusted model† PR (95%CI)
<i>p-value</i>	<i><0.001</i>	<i><0.001</i>
Stability	1.00	1.00
Decrease (<5%)	2.47 (1.95; 3.11)	2.09 (1.62; 2.71)
Increase (>5%)	0.65 (0.36; 1.16)	0.70 (0.39; 1.27)

PR – Prevalence ratio; 95%CI – 95% confidence interval

†Adjusted for sex, skin colour, age, marital status, SES, formal education, smoking status, alcohol consumption, quality of diet, physical activity, nutritional status and multimorbidity.

The significant association between reduced CC and functional disability observed in this study supports the growing body of evidence that links muscle atrophy with impaired physical function.

Despite limitations, such as the disruption of follow-up due to the COVID-19 pandemic and reliance on self-reported data, the study's longitudinal design and representative sample lend robustness to its conclusions. The findings call for regular monitoring of muscle health in older adults and suggest that interventions like resistance training and nutritional support can help preserve muscle mass and function, ultimately improving health outcomes.

4. CONCLUSION

In conclusion, a decrease in CC in a six-year period was associated with higher prevalence of functional disability and frailty. These results highlight the importance of maintaining muscle health in older adults to prevent adverse outcomes, and underscore the need for regular monitoring of muscle mass and timely interventions to preserve muscle function. As aging populations continue to grow, particularly in LMICs, addressing muscle health through public health strategies and clinical practices will be essential to improving the health and quality of life of older adults.

5. REFERENCES

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