Shortened telomeres and their association with sarcopenia and frailty in older adults

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INTRODUCTION

In response to an aging society, there is a growing interest in research on the cellular and molecular mechanisms of aging. Telomere shortening is considered one of the potential molecular causes of the risk of developing age-related pathologies. Sarcopenia and frailty are overlapping geriatric syndromes that, due to reduced muscle mass, strength, and functional capacity, lead to impaired quality of life, increased morbidity and mortality in older adults. However, the pathogenesis and molecular mechanisms of these syndromes remain poorly understood. Therefore, **the aim of this study** was to investigate the properties of leukocyte telomere length in older adults with sarcopenia and frailty.

METHODS

This study included 197 older adults (aged 82.2±7.6 years): 121 individuals with sarcopenia and/or frailty (aged 85.3±6.7 years) and 75 community-dwelling older adults (aged 80.2±7.5 years) without sarcopenia and/or frailty. Sarcopenia was confirmed according to the European Working Group on Sarcopenia in Older People (EWGSOP) guidelines, and frailty was assessed by Fried's criteria. Phenotypic data were collected via questionnaires, scales (e.g., Physical Activity Scale for Elderly (PASE)), and measurements of anthropometric and physiological characteristics. Statistical analysis was performed using R Studio (version 4.3.1).

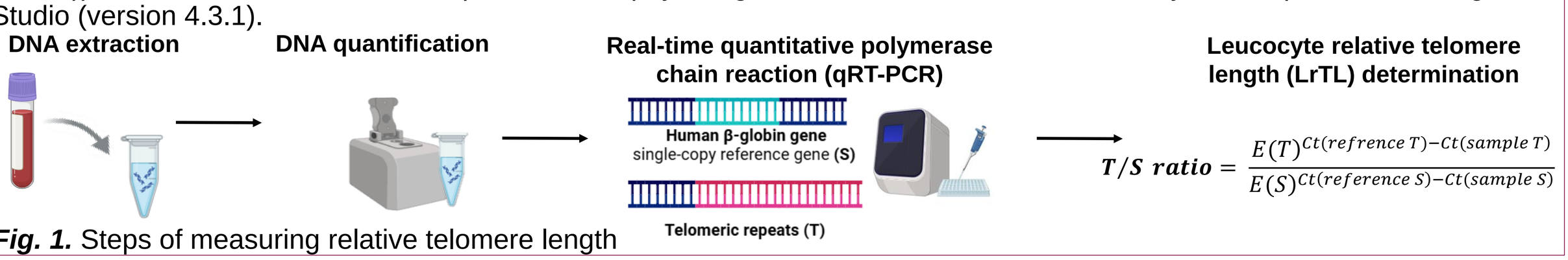

Fig. 1. Steps of measuring relative telomere length

RESULTS

The average LrTL in older adults participating in this study was 0.408±0.262 T/S units, with no significant gender differences in LrTL.

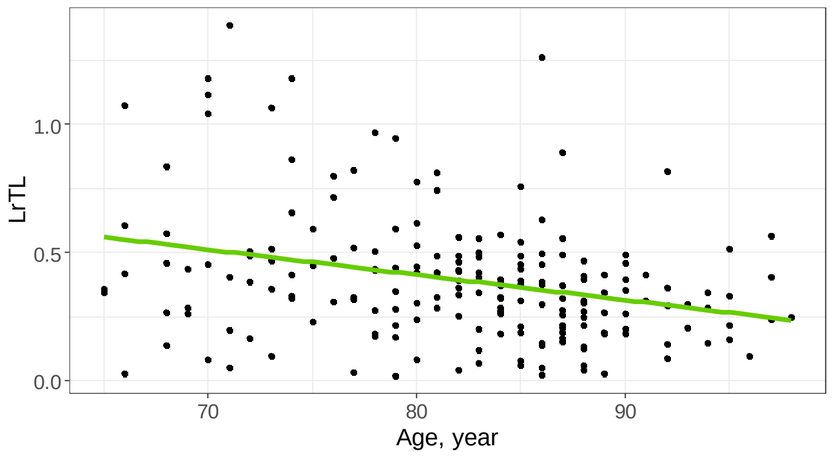

Fig. 2. Correlation between LrTL and age (r = –0.29, p<0.001)

Table 1. LrTL Differences in Older Adults by Sarcopenia and Frailty Status

	Relative telomere length (T/S ratio)			
	Unadjusted mean (95 % CI)	p	Adjusted mean (95 % CI)[a]	p
Healthy older adults (n = 75)	0.469 (0.398–0.539)		0.435 (0.368–0.509)	
Sarcopenia and/or frailty (n = 121)	0.345 (0.310–0.380)	**0.002**	0.360 (0.311–0.410)	0.051
Sarcopenia (n = 93)	0.347 (0.304–0.391)	**0.004**	0.368 (0.311–0.425)	0.126
Frailty (n = 90)	0.308 (0.274–0.342)	**p < 0.001**	0.330 (0.275–0.385)	**0.005**

[a] adjusted by age and gender

The likelihood of developing sarcopenia and/or frailty increased by 12.5% with each additional year of age (OR=1.125, 95% CI [1.033, 1.228], p=0.007).

An interaction was also observed between LrTL and physical activity level *(Fig. 3):* longer LrTL was associated with higher PASE scores (β=46.10, 95 % CI [20.22, 71.99], p<0.001), although this relationship weakened with increasing age.

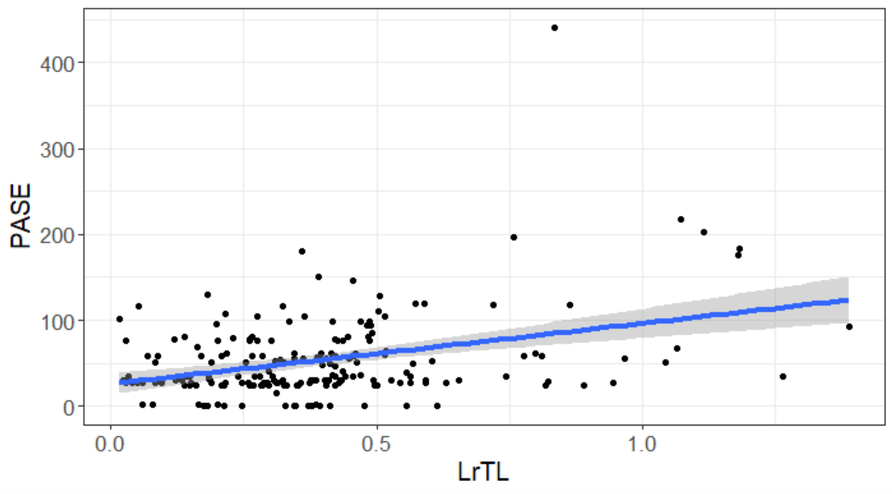

Fig. 3. Association between LrTL and physical activity (PASE)

CONCLUSIONS

Conclusions. Our findings indicate a significant correlation between shorter telomeres and greater manifestations of frailty and sarcopenia, suggesting that telomere length may serve as a biomarker for these age-related conditions. A deeper understanding of this association could inform interventions aimed at improving healthspan and quality of life in the aging populations.

ACKNOWLEDGMENTS

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