

ABSTRACT:

Introduction: Heart failure (HF) is a disease of premature cellular aging, and the length of telomeres, a measure of cellular age, is significantly reduced in persons with HF. Chronic inflammation in HF is associated with disease progression and worse outcomes. While inflammation is a putative mechanism contributing to telomere shortening, this relationship has yet to be explored in HF. Physical activity in healthy individuals has been known to increase telomere length, although the effects in individuals with HF are unknown. Therefore, the purpose of this study is to examine the effects of exercise on telomere length and the relationship between telomere length and the inflammatory cytokine interleukin [IL]-1 β in persons with HF.

Methods: This study is a secondary analysis of stored samples from persons with HF who participated in a 3-month home-based aerobic exercise intervention (n=16) or received usual care (n=15). IL-1 β was measured in triplicate via ELISA (eBioscience). Genomic DNA was extracted from peripheral blood mononuclear cells. DNA integrity and quantification were assessed using a dsDNA assay kit. Absolute telomere length was measured in triplicate via quantitative real-time PCR. The Student's t-test was used to examine between group and within group differences at baseline and 3-months, and Pearson correlations were used to examine relationships between telomere length and cytokines. Effect size was calculated using Hedges' g. All data were analyzed using SAS version 9.4 with an alpha set at 0.05.

Results: Plasma IL-1 β was lower among the exercise group as compared to control at 3 months (1.43 ± 0.5 pg/mL vs. 2.09 ± 1.3 pg/mL; $p=.02$), with a medium effect size of .83. Total telomere length increased in the exercise group from baseline to 3 months (9.29 ± 1.2 vs 10.38 ± 1.22 kb/chromosome) with a medium effect size of .76. No changes over time were found for the control group ($p=.85$). Total telomere length was negatively associated with IL-1 β at baseline ($r=-.441$, $p=.003$).

Conclusions: A 3-month exercise intervention was related to increased telomere length and decreased IL-1 β in persons with HF.

Implications: