Vastus Lateralis CSA And 1RM Leg Extension Strength Are Correlated With Moderate Training Volumes Among Older Adults

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Background

- Longitudinal aging studies have shown that the gradual loss of muscle strength is closely associated with changes in **muscle quality**, but not **muscle mass**[1].
- Skeletal muscle echo intensity (EI) obtained via B-mode ultrasonography reflects intramuscular adiposity and/or fibrous tissue content and shows promise as a simple measure of muscle quality among older adults[2].
- Little is known if manipulating training volume improves EI.
- We sought to examine the effects of different resistance training volume on **muscle strength, size, and EI** among older adults, and if these improvements were associated.

Methods

Participants

- 25 older adults (14 males, 11 females, mean ± SD age = 70 ± 7 years, BMI = 24.5 ± 3.1 kg/m^2)

Testing

- Vastus lateralis (VL) cross sectional area (CSA) and EI
- One repetition maximum leg extension (1RM)

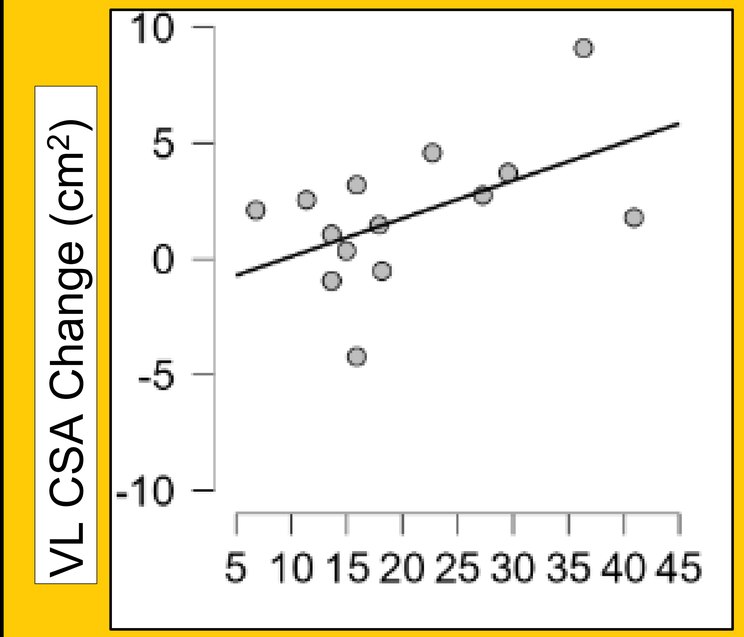
Training Program

- Supervised, lower-body resistance training program twice per week for 6 weeks
- Leg extension, trap bar deadlift and leg press performed with full range of motion at 85% of estimated one repetition maximum (1RM) for 2 or 6 sets per exercise

Statistical Analyses

- Repeated measures ANOVAs and Bivariate Correlations

Moderate Training Volumes Are Associated With Improvements In Older Muscles Size And Strength



r = 0.522, p = 0.046

VL EI

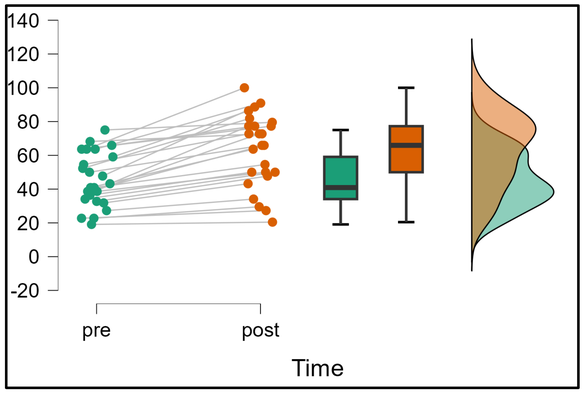
Repeated measures ANOVA showed a main effect for time (F = 5.761, p = 0.025, η_p^2 = 0.200).

VL CSA

Repeated measures ANOVA showed a main effect for time (F = 6.95, p = 0.015, η_p^2 = 0.232)

Leg Extension 1RM

A significant main effect for time (p<**0.001**) was observed for leg extension 1RM regardless of training volume (F = 60.25, p < 0.001, η_p^2 = 0.724)



Raincloud plot depicting individual pre-post changes in leg extension 1RM

Conclusion

- We observed significant improvements in VL EI, CSA and leg extension strength regardless of resistance training volume.
- While our findings suggest that EI may not be modifiable through manipulating resistance training volume, there are clear associations between improvements in muscle size and strength when performing moderate volume training among older adults.

Key References

1. Delmonico, M. J., Harris, T. B., Visser, M., Park, S. W., Conroy, M. B., Velasquez-Mieyer, P., Boudreau, R., Manini, T. M., Nevitt, M., Newman, A. B., & Goodpaster, B. H. (2009). Longitudinal study of muscle strength, quality, and adipose tissue infiltration12. The American Journal of Clinical Nutrition, 90(6), 1579–1585. https://doi.org/10.3945/ajcn.2009.28047
2. Paris, M. T., & Mourtzakis, M. (2021). Muscle Composition Analysis of Ultrasound Images: A Narrative Review of Texture Analysis. *Ultrasound in Medicine & Biology*, *47*(4), 880–895. https://doi.org/10.1016/j.ultrasmedbio.2020.12.012

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