Differences in lower limb strength in persons with multiple sclerosis with and without vascular comorbidities

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BACKGROUND

- Vascular comorbidities (VC) are prevalent in persons with multiple sclerosis (PwMS) and exacerbate disease progression and physical disability.
- VC can negatively impact muscle metabolism, perfusion, and neuromuscular function, which may independently reduce muscle strength regardless of MS disease burden.

OBJECTIVES

- To determine whether PwMS with VC exhibit reduced lower limb (LL) isometric muscle strength compared to those without VC.

METHODS

Secondary analysis of a large cross-sectional study.

Measures

- *LL isometric strength:* Peak torque for the weakest and strongest limbs normalized to body weight:
  - Hip flexion, extension, and abduction
  - Knee extension and flexion
  - Ankle plantar flexion and dorsiflexion
- *Clinical characteristics:* BMI, disease duration, and self-report VC status (hypertension (HTN), hyperlipidemia (HLD), diabetes (DM) and heart disease).

Statistical Approach

- Differences in LL strength between VC groups were examined using Mann-Whitney U and t-tests.
- Significant differences were examined using linear regression, with dichotomized VC status as the independent variable and age, sex, race, education, and disease duration as covariates.
- Exploratory regressions were then performed with the individual VC in the model.

CONCLUSIONS

VC negatively affect bilateral hip extensor and abductor strength in PwMS across stronger and weaker limbs.

Early vascular screening and integrated rehabilitation, which including that combine resistance training with cardiovascular risk management, should be considered to preserve mobility and limit disability progression.

- Combined VC, rather than individual comorbidities, were associated with reduced isometric LL strength in PwMS, suggesting a compounding effect.
- Hip extensors and abductors are critical for postural stability, gait, and transfers, linking VC to functional limitations.

Scan QR code for full Results tables

RESULTS

Significantly different characteristics and LL muscles (after controlling for covariates) by VC status

Variable	VC (n = 82)	No VC (n = 101)	p-value
Age, years	60.0	48.0	< .001
BMI	30.6	26.6	.001
Disease duration, years	14.9	10.8	.017
Hip extensor strength (SL)	0.49	0.66	< .001
Hip abductor strength (SL)	0.71	0.89	< .001
Hip extensor strength (WL)	0.42	0.52	< .001
Hip abductor strength (WL)	0.60	0.73	< .001

Abbreviations: BMI = body mass index; SL = stronger limb; VC = vascular comorbidity WL = weaker limb. Sample: 183 PwMS; 44.8% (n = 82) had ≥1 VC.

**All other comparisons can be seen in the full results tables by scanning the QR code*

Vascular Comorbidity Prevalence (Overall Sample)

Comorbidity	Prevalence
HTN	26.8%
HLD	29.0%
DM	9.3%
Heart disease	4.3%

Associations Between VC Status and Lower-Limb Strength

Outcome		β Coefficient (VC vs No VC)	p-value
Strength	Hip extensor	−0.09 to −0.10	≤ .038
	Hip abductor	−0.10	≤ .036

Adjusted for: age, sex, race, education, and disease duration.

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ACKNOWLEDGEMENTS

This study used data collected as part of a larger study supported by internal Saint Francis BestCare Grant conducted at The Joyce D. and Andrew J. Mandell Center for Comprehensive Multiple Sclerosis Care and Neuroscience Research at the Mount Sinai Rehabilitation Hospital, Trinity Health Of New England, and approved by the Institutional Review Board.