

Elizabeth J. Pekas, Steven D. Scott, Ronald J. Headid III, Michael D. Shukis, Jeonghwa Shin, Jiwon Song, and Song-Young Park

University of Nebraska at Omaha, School of Health and Kinesiology, Omaha, NE

BACKGROUND

- Peripheral arterial disease (PAD) is the manifestation of atherosclerotic plaque in the larger arteries of the legs, which results in impaired blood flow to the lower extremities.
- Markers of vascular health, such as endothelial function and arterial stiffness, have been shown to be attenuated in patients with PAD.
- Endothelial dysfunction specifically has been shown to be associated with poor nitric oxide (NO) bioavailability. Nitrate (NO_3^-), an NO-donor, has demonstrated beneficial effects on improving NO bioavailability and vascular parameters in patients with PAD.
- Previous studies have utilized unspecified doses of beetroot juice (high NO_3^- content) for patients with PAD, therefore a standardized dose of beetroot juice has not yet been elucidated. Therefore, the effects of a body mass-normalized dose of NO_3^- on vascular parameters in patients with PAD has been examined in this study.

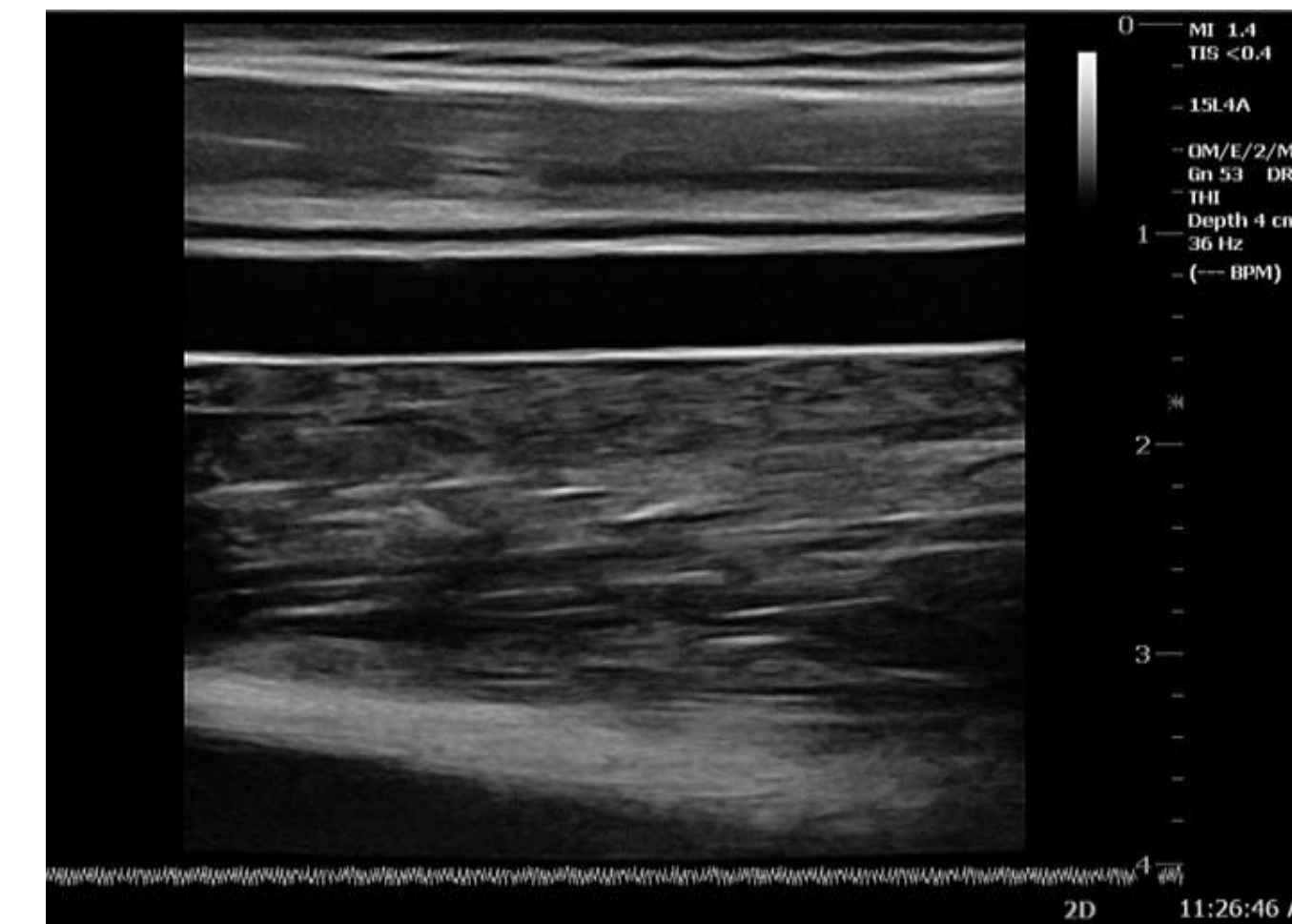
PURPOSE

- To examine the impacts of a NO_3^- supplement, specifically a body-mass normalized dose of beetroot juice, on endothelial function, arterial stiffness, and central and peripheral blood pressure (BP) in patients with PAD.
- Hypothesis: it was hypothesized that acute intake of NO_3^- would improve vascular function.

METHODS

- 2 patients with PAD (stage II-III, age around 73) had vascular measurements taken pre- and post-beetroot juice ingestion.
- Beetroot juice dosage was $\sim 0.11 \text{ mmol NO}_3^-/\text{kg}$ body mass
- Height, mass, body composition, and grip strength were measured to determine participant characteristics.
- Vascular measurements including resting heart rate, peripheral BP, central BP, augmented pressure, deceleration time, endothelial function (flow-mediated dilation), and arterial stiffness (carotid-to-radial pulse-wave velocity and augmentation index) were taken pre- and post-nitrate ingestion.

METHODS



Flow-mediated dilation: non-invasive measurement of endothelial function using a trigger-monitor EKG system and Doppler ultrasound.

RESULTS

Table 1. Participant characteristics and vascular function parameters pre- and post-beetroot juice intake.

	Pre	Post	Δ
Age, y	73	73	0
Height, cm	165.75	165.75	0
Mass, kg	71.1	71.1	0
BMI, kg/m^2	25.2	25.2	0
Body fat, %	39.75	39.75	0
R grip strength	13	13	0
L grip strength	41	41	0
Heart rate, bpm	75	75.5	0.5
Peripheral pulse pressure, mmHg	54	49.5	-4.5
Central pulse pressure, mmHg	51	37	-14
Augmented pressure, mmHg	11.5	6.5	-5

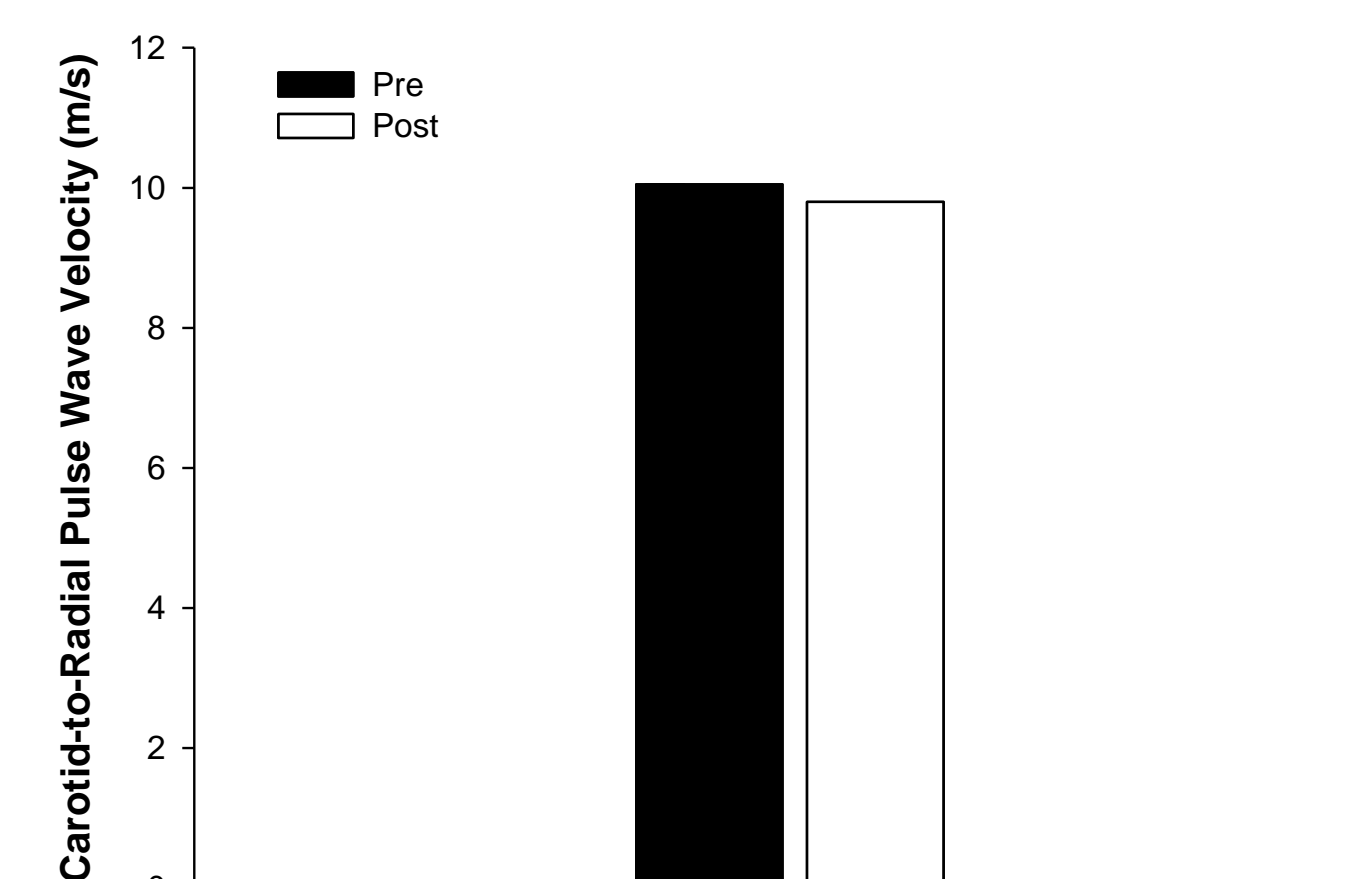


Figure 1. Carotid-to-radial pulse wave velocity (m/s) pre- and post-beetroot juice intake

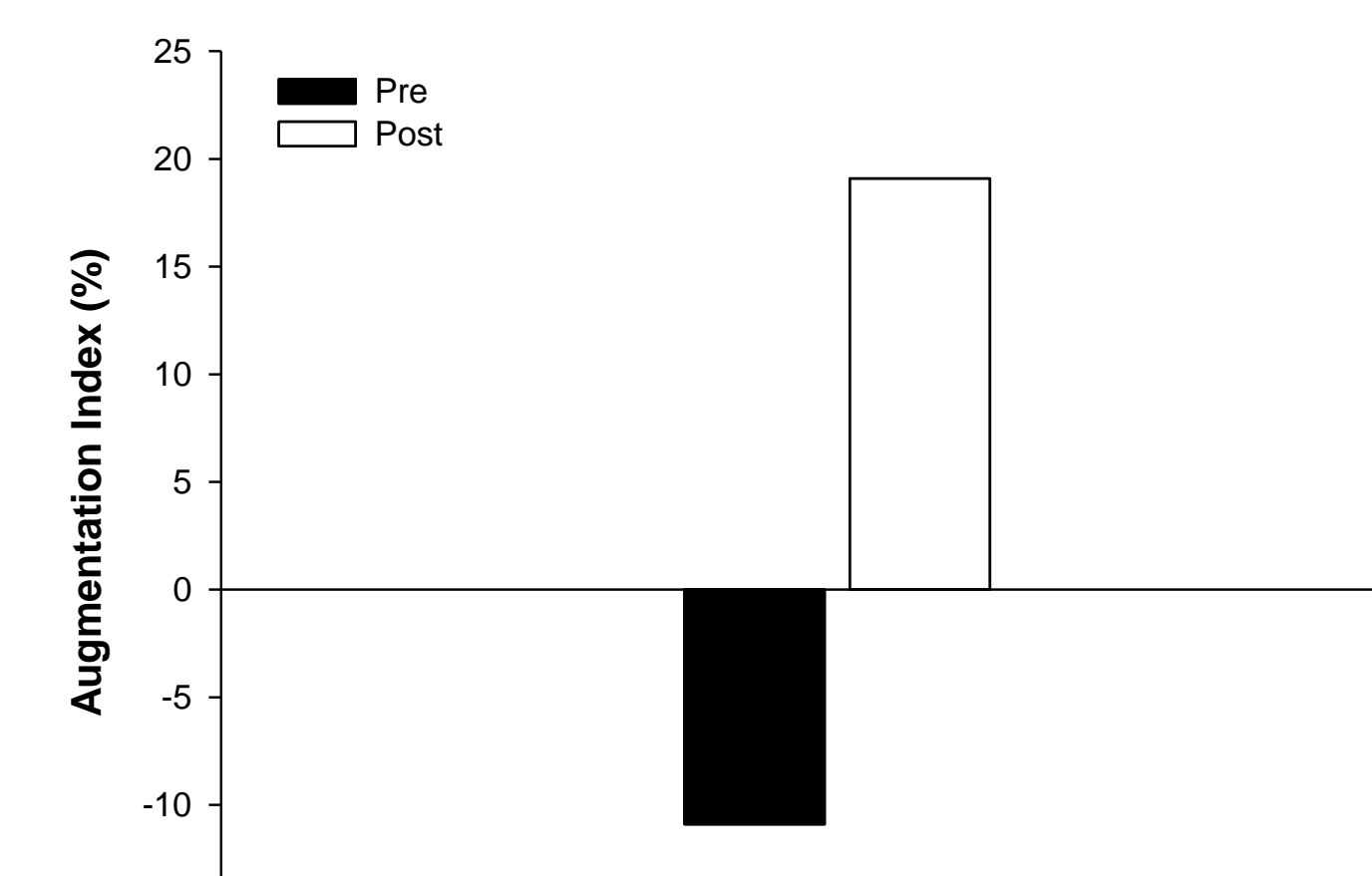


Figure 2. Augmentation index (%) pre- and post-beetroot juice intake

RESULTS

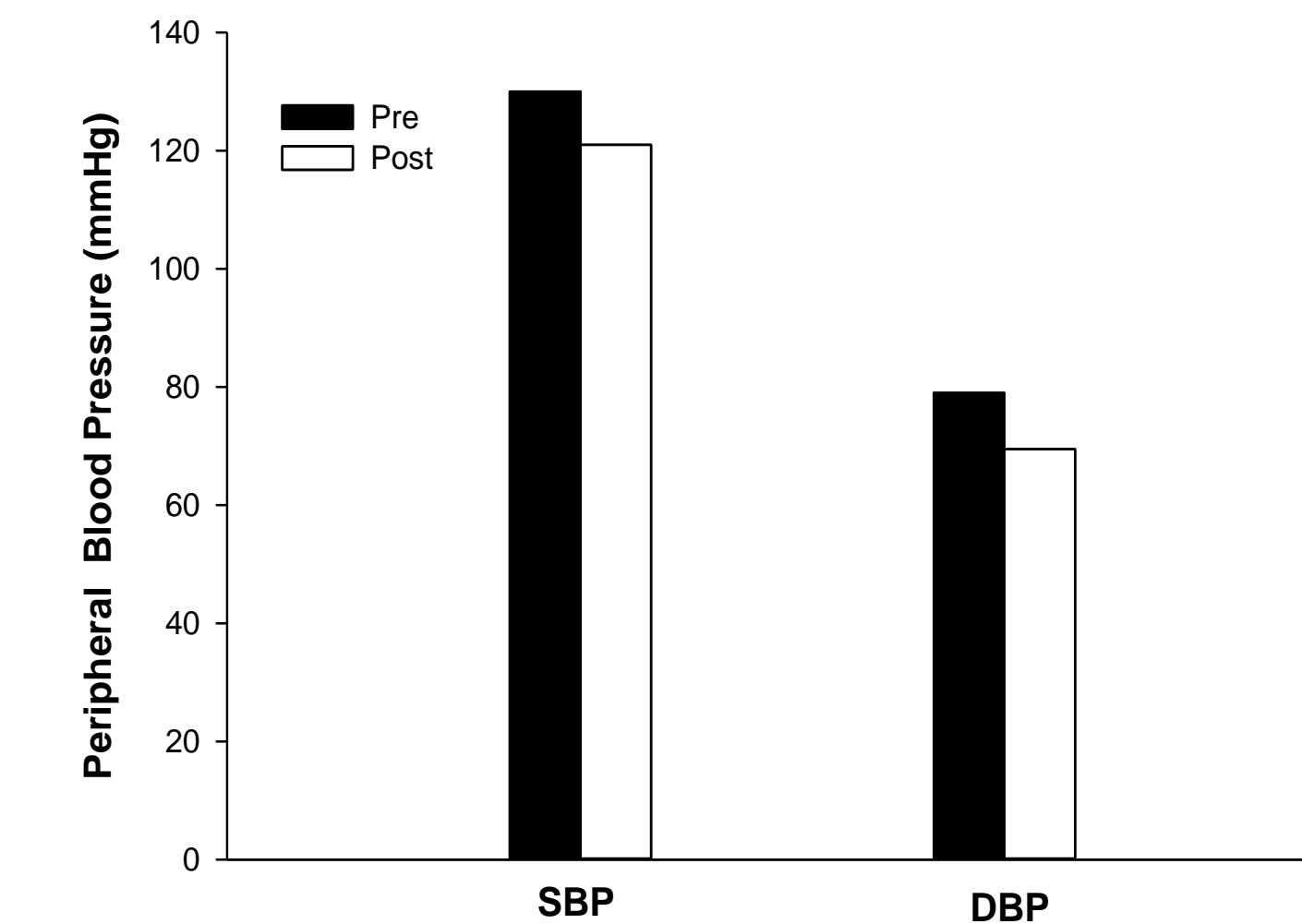


Figure 3. Peripheral blood pressure (mmHg) pre- and post-beetroot juice intake

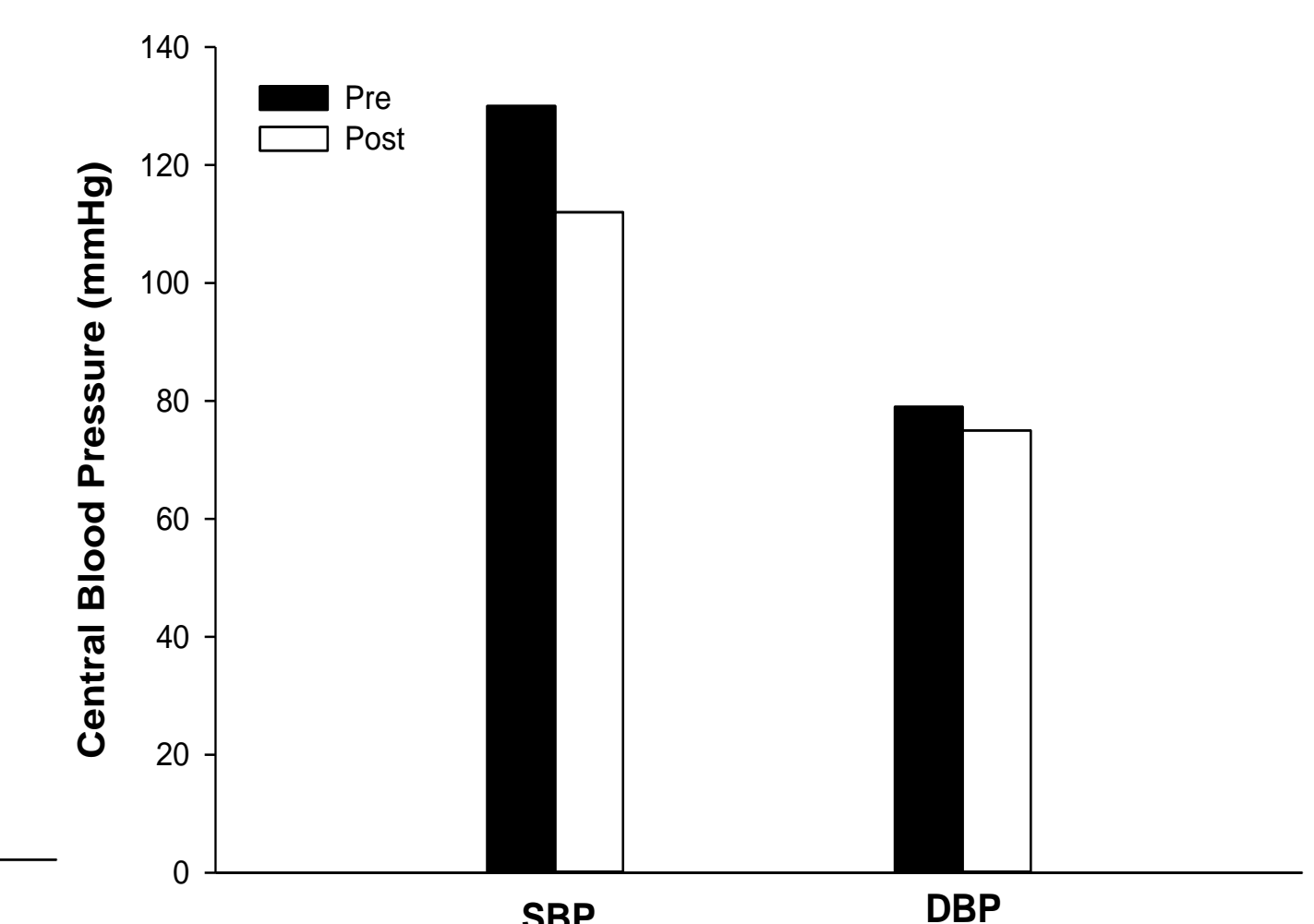


Figure 4. Central blood pressure (mmHg) pre- and post-beetroot juice intake

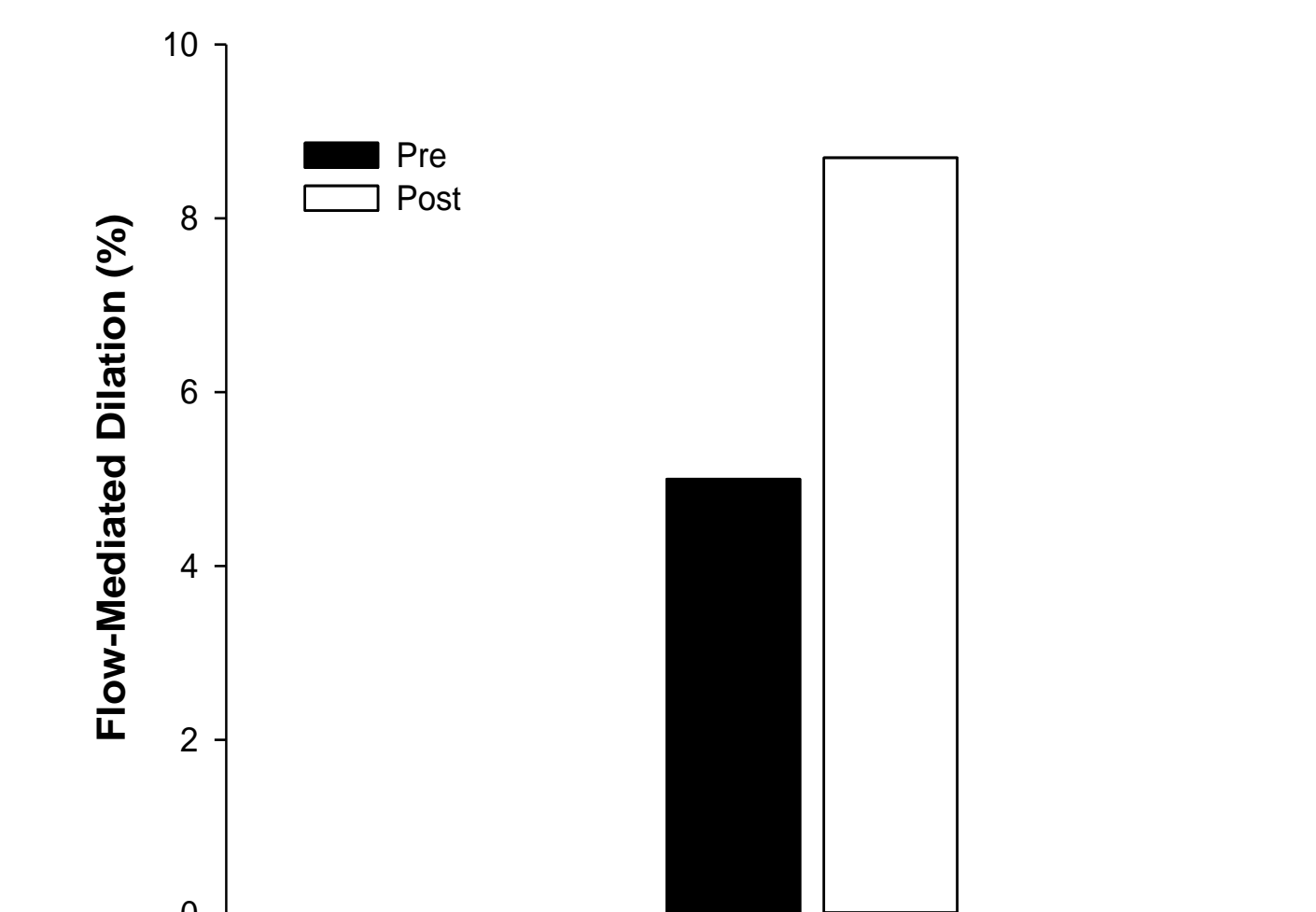


Figure 5. Flow-mediated dilation (%) pre- and post-beetroot juice intake

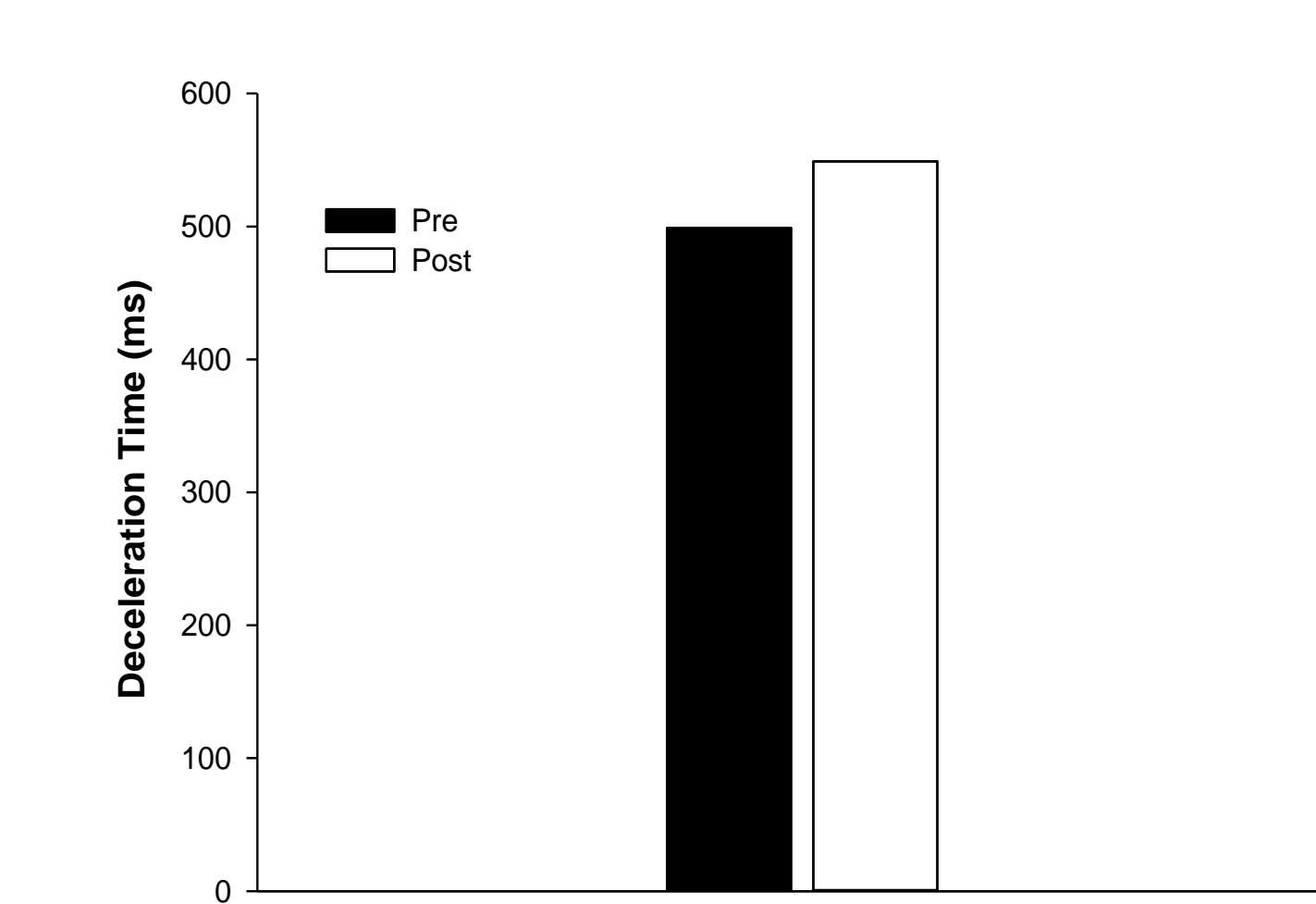


Figure 6. Deceleration time (ms) pre- and post-beetroot juice intake

CONCLUSIONS

- Our preliminary findings suggest that acute intake of a NO_3^- supplement normalized to body mass may potentially be a useful therapeutic treatment to improve endothelial function and both central and peripheral vascular function.
- However, this is a pilot study and investigation with a larger sample size is warranted.

This project was funded by the Graduate Research and Creative Activity (GRACA) Grant and the NASA Nebraska Space Grant (#NNX15AI09H).