Blood Pressure Reactivity During Isometric Handgrip Exercise Between Adults With and Without Obesity

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INTRODUCTION

- High blood pressure (BP) reactivity during exercise predicts higher future cardiovascular disease risk.[1]
- Previous studies indicate that individuals with stage 3 obesity (body mass index [BMI] ≥40 kg/m²) have elevated BP reactivity, but it is unclear whether stage 1-2 obesity (BMI 30-40 kg/m²) has a similar effect on BP reactivity.[2]
- Understanding whether milder forms of obesity influence BP reactivity during exercise can help inform cardiovascular disease prevention strategies.

PURPOSE

- To test the hypothesis that adults with stage 1-2 obesity exhibit higher BP reactivity than adults without obesity during isometric handgrip exercise.

EXPERIMENTAL DESIGN

- Screening information was compared between those with and without obesity using unpaired, two-tailed t-tests for normally distributed data or the Mann-Whitney U test for non-normally distributed data (**Table 1**).
- We measured heart rate via electrocardiogram (ECG) and beat-to-beat hemodynamics via finger photoplethysmography.
- The protocol consisted of a 10-minute baseline measurement followed by a 2-minute bout of isometric handgrip exercise at 40% of maximal voluntary contraction (MVC).
- We analyzed differences (Δ) between baseline and the final minute of handgrip (handgrip-baseline) using unpaired, two-tailed t-tests for normally distributed data and Mann-Whitney U test for non-normally distributed data (**Figure 1**).
- Given that absolute force production can influence BP reactivity, additional analyses were conducted using ANCOVA with statistical adjustment for MVC (**Figure 1**).
- All statistical analyses were performed with an $\alpha<0.05$ for significance.

QR CODE AND FUNDING SOURCES

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RESULTS

Table 1. Participant screening information

Characteristic	Without Obesity	With Obesity	*p*	Effect Size
Number of Participants	15	15	>0.99	-
Biological sex	7 Female/8 Male	6 Female/9 Male	>0.99	-
Age (years)	24 [6]	22 [7]	0.11	0.60
Body mass index (kg/m²)	23 ± 2	34 ± 3	**<0.0001**	2.50
Systolic BP (mmHg)	121 ± 10	124 ± 11	0.28	0.30
Diastolic BP (mmHg)	76 ± 8	78 ± 9	0.32	0.25

We present data as median [IQR] or mean ± SD. We compared groups using Fisher's exact test (proportion of female & male adults), a Mann-Whitney test (age), and unpaired, two-tailed t-tests.

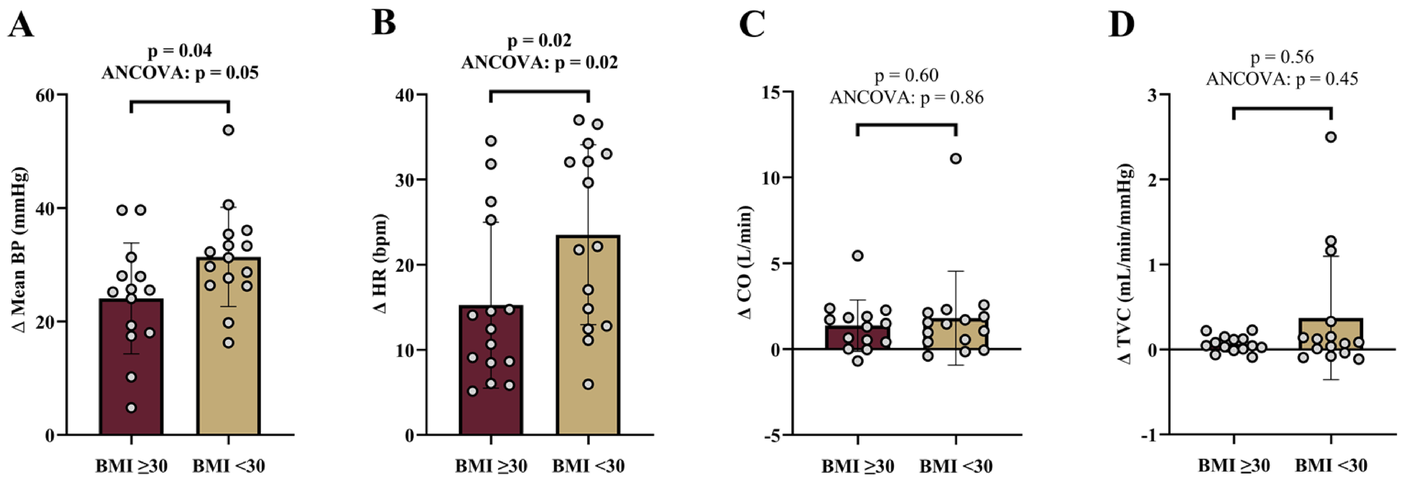

Figure 1. Cardiovascular Responses During Isometric Handgrip Exercise. (A) ΔMean BP was higher in the group without obesity. **(B)** ΔHeart rate (HR) was higher in the group without obesity. **(C)** ΔCardiac output (CO) and **(D)** ΔTotal vascular conductance (TVC) did not differ between groups.

CONCLUSION

Contrary to the hypothesis, BP reactivity during isometric handgrip exercise was lower in adults with stage 1-2 obesity than in adults without obesity. This suggests a blunted cardiovascular (BP and heart rate) response during exercise for young adults with obesity who are otherwise healthy.

REFERENCES

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