

The Effect of Nasal versus Oral Breathing on Blood Pressure at Rest and During Exercise

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INTRODUCTION

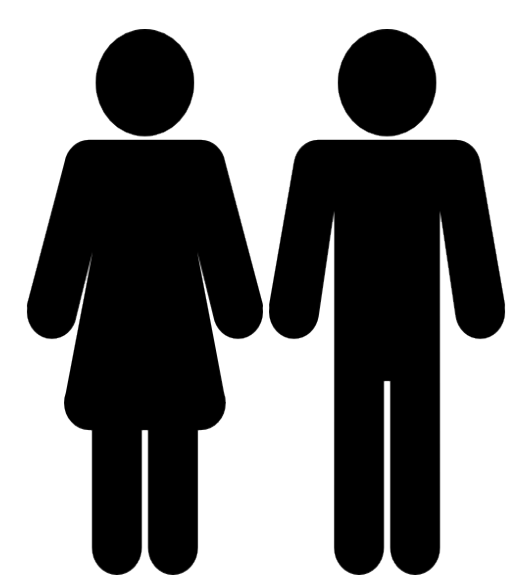
- Some (1), but not all (2,3), research suggests that paced breathing at a lower respiratory rate lowers systolic and diastolic blood pressure (BP).
- However, these studies have not considered whether the route of breathing affects BP (4). This is relevant because nasal breathing reduces accessory inspiratory muscle recruitment and increases diaphragmatic movement (4), which could lower BP via the autonomic nervous system (5) at rest.
- Further, nasal breathing reduces ventilatory responses and metabolic demand during submaximal exercise (6), which could attenuate the cardiovascular response (e.g., BP response) during exercise.

PURPOSE

- Therefore, we tested the hypothesis that nose-only versus mouth-only breathing would lower BP at rest and during exercise.

EXPERIMENTAL DESIGN

RECRUITMENT



Using a Qualtrics survey, we recruited 10 healthy adults (Table 1) 18 - 30 years old, with a blood pressure \leq 140/90 mmHg, and a body mass index below 30 kg/m².

Table 1. Participant screening characteristics

# of Participants	Age	Body mass index
10 (male = 5, female = 5)	18.3 \pm 0.5	22.9 \pm 2.7

We present data as mean \pm standard deviation.

RESTING MEASURES



Resting on an upright bed, we attached a fabric belt to measure respiratory rate and an upper arm cuff to measure blood pressure. Blood pressure was measured during two different epochs, 5 minutes each, with nasal-only and oral-only breathing in a randomized order.

SUBMAXIMAL EXERCISE



Participants completed lower-body cycling at 75 watts at \geq 60 revolutions/minute. Blood pressure was measured during two different epochs, 7 minutes each, with nasal-only and oral-only breathing in a randomized order.

RESULTS

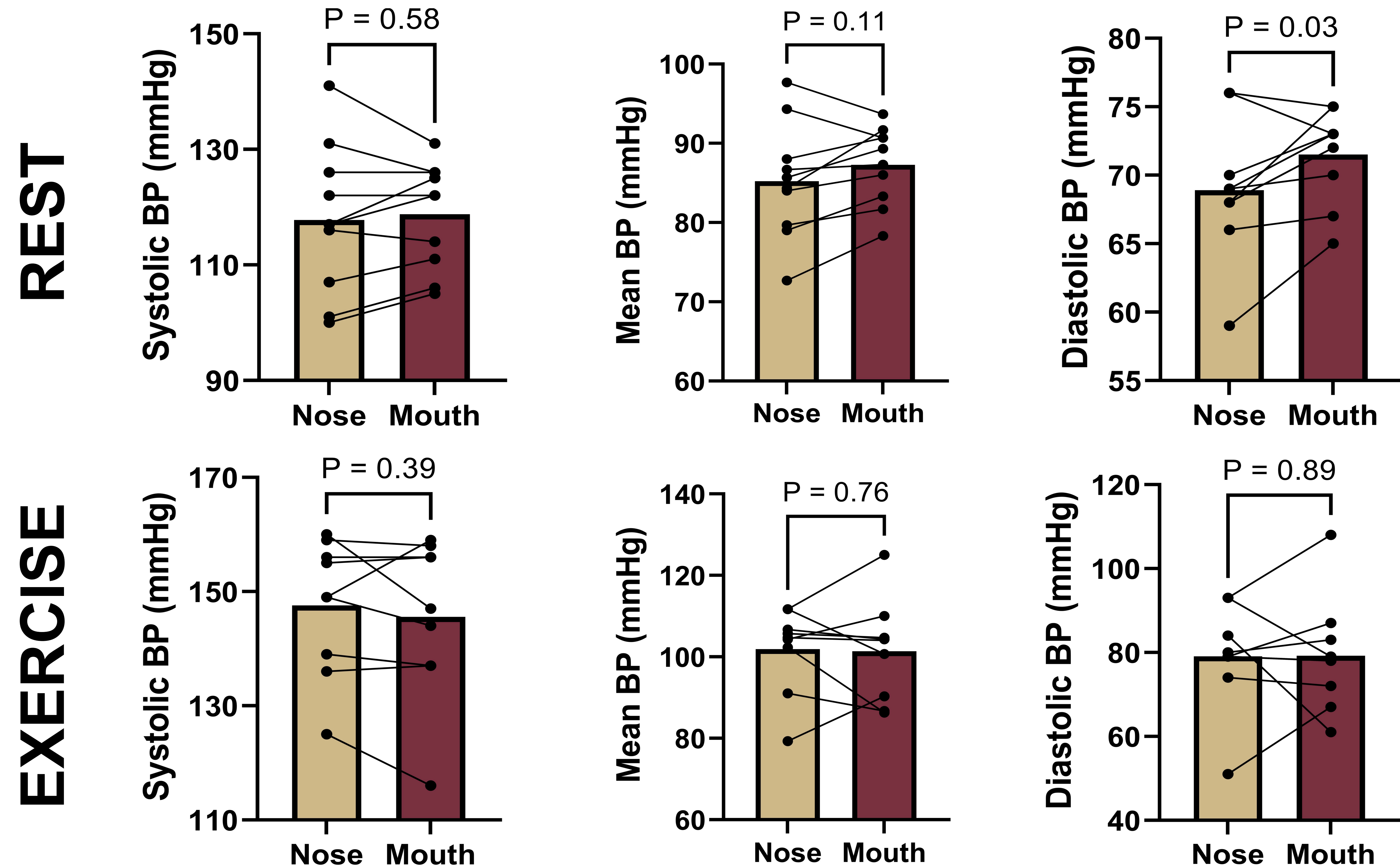


Figure 1. Blood pressure at rest and during exercise. Respiratory rate did not differ between conditions at rest (Nose: 15.9 \pm 3.2 vs. Mouth: 15.6 \pm 3.1, $p = 0.08$) or during exercise (Nose: 25.0 \pm 3.7 vs. Mouth: 24.3 \pm 3.7, $p = 0.31$). We compared data using paired, two-tailed t-tests.

CONCLUSIONS

These preliminary data suggest that nose-only breathing may lower diastolic, but not systolic, blood pressure at rest and not during exercise.

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