The Airway Occlusion Pressure During Upper Extremity Exercise in Healthy Adults:
Differences between Supported and Unsupported Arm Exercise

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Purpose: The purpose of this study was to examine the effect of supported and unsupported arm exercise on the 2 dyspnea indexes, namely, airway occlusion pressure ($P_{01}$) and the ratio of the change in ventilation to the change in $P_{01}$ ($\Delta VE/\Delta P_{01}$), by using symptom-limited exercise stress testing.

Methods: Twenty-one healthy male volunteers performed both these exercises with 3 increments (stage 1 to 3) in oxygen consumption, defined as exercise intensity. Each stage was performed at the same intensity between the 2 exercises, to aid in the comparison. The $P_{01}$, VE, carbon dioxide production ($VCO_2$), respiratory frequency (f), ventilatory equivalent of carbon dioxide ($VE/VCO_2$) and the Borg scale rating of perceived dyspnea and arm muscle exertion was obtained at each stage.

Results: The $P_{01}$ was significantly greater in the unsupported arm exercise than in the supported arm exercise ($P < 0.001$); however, there was no difference in $\Delta VE/\Delta P_{01}$ between the 2 exercises. With higher load, the corresponding $VE$, $VCO_2$, $f$, $VE/VCO_2$ and the Borg scale rating of perceived dyspnea were significantly greater in the unsupported arm exercise than in the supported arm exercise.

Conclusions: The results of this study indicate that there is a greater possibility of developing dyspnea during an unsupported arm exercise than during a supported arm exercise, possibly because of the greater ventilatory demand in the former.