

Comparison of 6 Oscillatory Positive Expiratory Pressure Devices During Active Expiratory Flow.

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Abstract:

BACKGROUND: Air-flow oscillations generated by exhaling through oscillatory positive expiratory pressure (OPEP) devices favor airway clearance. Variations in mechanical properties between different devices may influence therapeutic efficacy. The objective of this study was to assess mechanical properties in vitro and to compare the performance of 6 OPEP devices at different resistance levels under active expiratory flow patterns. **METHODS:** 4 gravity-dependent OPEP devices (ie, Flutter, Gelomuc, Pari O-PEP, Shaker Medic Plus) and 2 gravity-independent OPEP devices (ie, Acapella Choice and Aerobika) were each tested at low, medium, and high resistance settings. All devices were independently connected to a pulmonary waveform generator that reproduced active exhalation flows. Expiratory flow-volume curves were retrieved from 4 subjects with different stages of obstruction severity and were scaled according to either peak expiratory flow (4, 6, and 8 L/s) or volumes (2, 3 and 4 L), thus amounting to 24 active exhalations. Resulting waveforms were divided into 4 parts and the 2 middle parts were used to extract the following mechanical data: positive expiratory pressure (PEP), maximum expiratory pressure (Ppeak), oscillation frequency, and flow oscillation amplitude. The percentage of tests achieving oscillation frequencies ≥ 12 Hz and PEP ≥ 10 cm H₂O was calculated for each device. **RESULTS:** Mechanistic effects of the Acapella, Aerobika, and Shaker devices were not comparable. The Flutter, Gelomuc, and Pari devices behaved similarly and achieved more tests with optimum oscillation frequency and PEP values than the other devices. These 3 devices also produced the highest oscillation amplitudes at the low-resistance level, whereas the Aerobika elicited higher and consistent oscillation amplitudes at medium and high resistance settings. **CONCLUSIONS:** Operational parameters differed between and within devices, yet the Flutter, Gelomuc, and Pari devices were similar in many aspects. Therapeutic efficacy may depend on the selected OPEP device and set resistance.

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