

Nasal high-flow therapy reduces work of breathing compared with oxygen during sleep in COPD and smoking controls: a prospective observational study.

Biselli et al. *J Appl Physiol* (1985). 2017;122(1):82-88.

Abstract

Patients with chronic obstructive pulmonary disease (COPD) endure excessive resistive and elastic loads leading to chronic respiratory failure. Oxygen supplementation corrects hypoxemia but is not expected to reduce mechanical loads. Nasal high-flow (NHF) therapy supports breathing by reducing dead space, but it is unclear how it affects mechanical loads of patients with COPD. The objective of this study was to compare the effects of low-flow oxygen and NHF therapy on ventilation and work of breathing (WOB) in patients with COPD and controls during sleep. Patients with COPD (n = 12) and controls (n = 6) were recruited and submitted to polysomnography to measure sleep parameters and ventilation in response to administration of oxygen and NHF. A subset of six patients also had an esophageal catheter inserted for the purpose of measuring WOB. Patients with COPD had similar minute ventilation (\dot{V}_E) but lower tidal volumes than matched controls. With oxygen, [Formula: see text] was increased and \dot{V}_E was reduced in both controls and patients with COPD, but there was an increase in transcutaneous CO_2 levels. NHF produced a greater reduction in \dot{V}_E and was associated with a reduction in CO_2 levels. Although NHF halved WOB, oxygen produced only a minor reduction in this parameter. We conclude that oxygen produced little change in WOB, which was associated with CO_2 elevations. On the other hand, NHF produced a large reduction in \dot{V}_E and WOB with a concomitant decrease in CO_2 levels. Our data indicate that NHF improves alveolar ventilation during sleep compared with oxygen and room air in patients with COPD and therefore can decrease their cost of breathing.