

Effects of Combined Upper and Lower Respiratory Symptoms on Pulmonary Function and Exercise Tolerance Among Dyspneic Veterans

Thomas Ng, DO, MS¹; Anays M. Sotolongo, MD²; Andrew R. Berman MD, FCCP^{1,3}; Jennifer H. Therkorn, PhD²; Nisha Jani, PhD²; Michael J. Falvo, PhD²

¹Rutgers New Jersey Medical School, Department of Internal Medicine

²Department of Veterans Affairs, VA New Jersey Healthcare System

³ Rutgers New Jersey Medical School, Department of Pulmonary Critical Care Medicine

Upper and lower airway conditions appear to be increasing in prevalence among military veterans' post-deployment. Here, we examine the impact of combined upper (URS) and lower respiratory symptoms (LRS) on pulmonary function and exercise tolerance among veterans referred for chronic dyspnea.

Eighty-one veterans referred to our post-deployment specialty clinic presented with URS or LRS (URS/LRS; n = 41) or both (URS+LRS; n = 40). The presence of URS and LRS was determined via the Sino-Nasal Outcome Test and standardized questionnaire, respectively. All veterans completed complete pulmonary function testing (PFT). Exercise tolerance and physical health-related functioning was assessed via maximal cardiopulmonary exercise testing and questionnaire (VR-36 PCS). Between-group differences and effect sizes were assessed via unpaired t-tests and Hedges' *d*, respectively.

Groups (URS/LRS, URS+LRS) were similar for age (42.5±10.7, 44.9±8.3 years); body mass index (32.5±5.2, 32.3±7.0 kg/m²); tobacco history (13.7±7.8, 12.7±11.0 pack years); and deployment length (13.7±7.8, 12.7±11.0 months). Time from deployment to clinical evaluation was greater in veterans with URS+LRS (10.7±6.8, 14.5±8.6; p = 0.03, *d* = -0.49). PFTs were similar between groups with exception for residual volume/total lung capacity ratio (RV/TLC) (23.4±9.4, 28.9±9.9; p = 0.01, *d* = -0.56); Forced Vital Capacity (FVC%) (97.9±12.7, 88.4±18.5; p < 0.01, *d* = 0.59); and Forced Expiratory Volume (FEV₁%) (95.0±15.3, 86.5±20.5, p = 0.04, *d* = 0.47). Peak exercise capacity (VO₂%: 88.8±18.2, 77.6±17.0; p < 0.01, *d* = 0.63) and physical-health related functioning (PCS: 34.2±9.2, 25.9±7.9, *d* = 0.95).

Combined URS and LRS represent a major cause of morbidity in veterans. Those with combined URS+LRS were found to have higher RV/TLC, lower FVC% and FEV₁%, with worse exercise tolerance and overall quality of life than those with only LRS/URS. Further studies are needed in order to further explore the interdependence of the upper and lower respiratory tracts.