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Full Length Research Paper

Influence of sitting posture on tidal volume, respiratory rate, and upper trapezius activity during quiet breathing in patients with chronic obstructive pulmonary disease

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This study was performed to determine the influence of sitting posture on tidal volume (TV), respiratory rate (RR), and muscle activity of the upper trapezius (UT) in patients with chronic obstructive pulmonary disease (COPD). Fifteen men with COPD based on the Global initiative for Chronic Obstructive Lung Disease (GOLD) criteria, participated in the study. Inductive respiratory plethysmography and surface electromyography were used to simultaneously measure TV, RR, and muscle activity of the UT during quiet natural breathing (QB) in three sitting postures: neutral position (NP), forward-leaning position with arm support (WAS), and forward-leaning position with arm and head support (WAHS). A video motion-analysis system was used to measure the distance between the tragus and acromion during each experimental sitting posture. TV and RR were not significantly different between the three sitting postures; however, muscle activity of the UT decreased significantly in the WAHS posture as compared with the NP posture. There was a significant difference in the distance between the tragus and the middle of the lateral aspect of the acromion between sitting postures. Based on the results of this study, the WAHS posture could be recommended to control the excessive recruitment of UT during inspiration for the patients with COPD.

Key words: Chronic obstructive pulmonary disease, muscle activity, respiratory rate, sitting posture, tidal volume.

INTRODUCTION

Patients with chronic obstructive pulmonary disease (COPD) report fatigue and dyspnea when performing activities associated with daily living (Panka et al., 2010). Dyspnea is a debilitating symptom (Yount et al., 2011) and a limiting factor during daily activities (Eisner et al., 2008) in patients with COPD. Neumann (2009) suggested that patients with COPD may assume a forward-leaning trunk position to reduce dyspnea, which involves stabilizing the body using the forearms.

A sitting posture with a forward-leaning trunk is recommended to relieve dyspnea in patients with COPD (O'Neill and McCarthy, 1983; Sharp et al., 1980). Kisner and Colby (2002) suggested that patients with COPD can assume a sitting posture with a forward-leaning truck to

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