The Effect of Body Position on Maximum Inspiratory and Expiratory Pressures and Forced Expiratory Flow Rates. McKenna AM, Nichols TJ, Nitsche KJ, and Hiebert JM. Department of Physical Therapy Education, Rockhurst University, Kansas City, MO. jean.hiebert@rockhurst.edu

Purpose: The lungs are free to move within the chest wall and, therefore, susceptible to internal and external forces. For example, the gravitational effects resulting from changes in body position modify the resting alignment of the diaphragm and abdominal contents, alter resistance imposed on muscles, and vary ventilation/perfusion relationships. Some of these effects on ventilatory mechanics have been documented. The purpose of this study was to examine the effect of different body positions on the ability of the lungs to forcefully inhale and exhale. More specifically, the purpose of this study was to compare forced vital capacity (FVC%), forced expiratory volume in one second as a percent of forced vital capacity (FEV_1/FVC%), maximum inspiratory pressure (MIP), and maximum expiratory pressure (MEP) values obtained during standing, sitting, forward sitting, supine, and prone positions.
Subjects: Twenty healthy subjects (8 men and 12 women 22-32 years of age) volunteered to participate in this study. Inclusion criteria consisted of: classification of low to moderate risk according to the American College of Sports Medicine ranking criteria, no history of past or present orthopedic injury or trunk scarring that prevented or limited chest movements, and no known neurological disease.
Methods and Materials: Subjects' maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) were measured using a Micro Direct MicroRPM Respiratory Pressure Meter (Lewiston, ME). Forced vital capacity percent (FVC%) and forced expiratory volume in one second as a percent of forced vital capacity (FEV_1/FVC%) were measured using the MedGraphics CPFS/D^{TM} USB Spirometer (St. Paul, MN). Measurements were obtained in random order with subjects in standing, sitting, forward sitting, supine, and prone positions.
Results: A repeated measures one-way ANOVA revealed no significant effect of position on MIP, MEP, and FEV1/FVC%. However, FVC was affected by position ($p \leq 0.05$). Follow up paired t-tests indicated the forced vital capacity in the supine position was significantly less than all other positions and in the prone position was less than standing and sitting ($p \leq 0.005$).
Conclusions: Results indicate body position does not affect some ventilatory mechanics in healthy adults. However, horizontal positions such as supine and prone did result in altered mechanics. It appears the gravitational effects on thoracic and abdominal structures as well as potential restrictions imposed by contact with the table surface have an impact on the ability to generate a prolonged forceful exhalation, even in healthy adults.

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