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The Influence of E-Stim on Posture and Respiratory Function to Improve Aerobic Capacity: A Pilot

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PURPOSE: Daily technology use and poor posture have paralleled trends in chronic neck pain, headache, musculoskeletal disorders in the spine, and respiratory dysfunction. Poor posture can negatively impact respiration resulting in impaired aerobic capacity and exercise performance. To address this, posture correction can be facilitated by techniques that include neuromuscular electrical stimulation (NMES). NMES is most often used for muscle re-education, strength, and motor performance. The influence of NMES on posture to improve respiratory function and exercise capacity is unknown. Therefore, the purpose of the study was to investigate the impact of NMES training on postural measures to improve respiratory volumes and subsequent aerobic performance. **METHODS:** 11 participants were randomized to experimental (NMES) or Control (C) groups. Familiarization preceded baseline testing. Measures included chest wall expansion, forced vital capacity (FVC), forced expiratory volume in one second (FEV₁), FEV₁: FVC ratio, tragus to wall and acromion to the wall distances, and maximal oxygen consumption (VO₂max). Two dual-channel neuromuscular stimulators were used for NMES application. Eight surface electrodes were placed bilaterally on the neck and back of all subjects. The NMES group received electrical signals that promoted moderate intensity motor responses in the target muscles. The C group's frequency and amplitude parameters differed to elicit a sensory response only. NMES sessions were ~20 minutes and took place 4-5 times per week for 24 total sessions. Pre and post measures were then analyzed. **RESULTS:** A significant difference in the NMES group was observed between baseline and session-12 for FVC (4.158 ± 0.718 L, $p=0.0242$). Both groups showed significant improvements in VO₂max (Control: Pre- 39.740 ± 5.743 ml/kg/min – Post- 41.120 ± 5.906 , $p=0.0208$ ml/kg/min; NMES: Pre- 37.528 ± 4.704 ml/kg/min – Post- 40.350 ± 4.720 ml/kg/min, $p<0.0001$). No other significant differences were identified. **CONCLUSION:** In the present study the use of NMES may be useful for posture correction and improving aerobic capacity with respect to FVC and VO₂max. However, additional research is warranted to explore the impacts of NMES in a larger population and for its potential use in a rehabilitative setting.