TACSM Abstract

Changes in Physical Function Following 4-weeks of Neuromuscular Electrical Stimulation Training in Older Adults

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ABSTRACT

Sarcopenia, the age-related loss of muscle mass and strength, can result in a decline in physical function. Neuromuscular electrical stimulation (NMES) has been shown to induce muscular adaptations that have the potential to translate to functional improvements; however, little is known regarding functional adaptations pre-post short-term NMES training, especially in older adults. **PURPOSE**: The aim of this study was to determine NMES-induced changes in lower extremity physical function following 4 weeks of an NMES training intervention of the quadriceps muscle in older adults. **METHODS**: Seventeen healthy, older adults (68.8 ± 1.8 years old) were divided into two groups: NMES (n = 12) and SHAM (n = 5). The NMES group underwent 12, 40-minute NMES training sessions to the quadriceps muscles on each leg 3x/week over 4 weeks, with the stimulation intensity adjusted every 5 minutes, as needed, to achieve a 15% target torque of each participant's maximal voluntary contraction (MVC). The stimulation parameters consisted of a 60 Hz stimulation frequency and a duty cycle of 10s on and 15s off. The SHAM group was blinded and did not receive any treatment. The following functional assessments were measured before and after the 4-week training period: Timed Up and Go (TUG), 5x Sit-to-Stand (5XSTS), Stair Climb (SC), and 6-Minute Walk Test (6MWT). Repeated-measures ANOVAs were used to determine changes in TUG, 5XSTS, SC, and 6MWT assessments pre-post NMES training and data are reported as mean ± SE. Statistical significance was set at $P < 0.05$. **RESULTS**: NMES training significantly improved TUG (NMES: 8.81 ± 0.54s vs. 7.67 ± 0.39s; $P = 0.002$; SHAM: 10.60 ± 2.41 vs. 10.93 ± 3.01s; $P = 0.652$; pre- and post-training, respectively) and SC (NMES: 4.03 ± 0.20s vs. 3.76 ± 0.16s; $P = 0.023$; SHAM: 6.53 ± 2.11 vs. 6.0 ± 1.78s; $P = 0.215$; pre- and post-training, respectively); however, 5XSTS (NMES: 9.70 ± 0.75 vs. 8.83 ± 0.72; $P > 0.05$; SHAM: 14.34 ± 3.64 vs. 13.28 ± 3.89; $P > 0.05$; pre- and post-training, respectively) and 6MWT (NMES: 610.10 ± 22.68 vs. 623.74 ± 14.73; $P > 0.05$; SHAM: 533.43 ± 82.44 vs. 587.81 ± 80.52; $P > 0.05$; pre- and post-training, respectively) did not change following the NMES intervention. **CONCLUSION**: Improvements in TUG and SC following 4 weeks of NMES training demonstrate augmented lower body physical function, suggesting that short-term NMES training programs may induce neuromuscular adaptations that contribute to these early improvements in physical function in older adults.