



Restoration of gait and motor recovery by functional electrical stimulation therapy in persons with stroke

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Abstract

Purpose. To evaluate the clinical efficacy of functional electrical stimulation (FES) therapy of the tibialis anterior (TA) muscle on gait restoration and enhancing motor recovery with stroke patients.

Method. Thirty hemiparetic participants with spastic foot-drop impairments who were at least 3 months post-stroke were recruited from a rehabilitation institute and were assigned either to a control group or a FES group. Both the groups participated in a conventional stroke rehabilitation program for 60 min per day, 5 days a week, for 12-weeks. The FES group received the electrical stimulation to the TA muscle for correction of foot-drop.

Results. Functional electric stimulation (FES) resulted in a 26.3% ($p < 0.001$) improvement of walking speed measured with 10-m walkway, whereas the improvement in the control group was only 11.5% ($p < 0.01$). The FES group also showed significantly greater improvements compared to control group in other gait parameters (e.g. cadence, step length), physiological cost index (PCI), ankle range of motion, spasticity of calf muscle, Fugl-Meyer scores, and the maximum value of the root mean square (RMS_{max}), which reflects the capacity of the muscle output.

Conclusions. These findings suggest that, the FES therapy combined with conventional therapy treatment more effectively improves the walking ability and enhances the motor recovery when compared with conventional therapy alone in stroke survivors.

Keywords: Stroke, functional electrical stimulation, gait, spasticity