

Effects of Functional Electrical Stimulation on Radial Nerve Latency, Amplitude and Nerve Conduction Velocity: A Randomized Controlled Study

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Abstract

Background: Stroke remains the leading cause of mortality and long term disability, often resulting in unilateral weakness, impaired motor control, and difficulties in performing activities of daily living. Many studies have stated that the individuals with post stroke hemiparesis may exhibit alteration in the latency, amplitude and motor nerve conduction velocity (NCV) of the radial, median, and ulnar nerves in the affected extremity. Functional Electrical Stimulation (FES), a therapeutic approach aimed at augmenting or restoring motor functions has demonstrated significant improvements in stroke survivors, with evidence supporting enhancement in motor recovery, activities of daily living, and overall reductions in disability. However, evidence regarding FES effectiveness in enhancing latency, amplitude and NCV changes in the peripheral nerves is lacking in the existing literatures.

Objective: The present study is aimed to investigate changes in the Compound Motor Action Potential (CMAP) latency, amplitude and NCV of the radial nerve following a four-week Functional Electrical Stimulation (FES) intervention.

Materials and Methods: Twenty-five post stroke individuals of ongoing study were randomly allocated into the experimental and control group. The experimental group was provided FES and Structural Therapeutic Exercises (STE), whereas control group received only STE. Functional electrical stimulation was applied on the extensors of the wrist and elbow joint of the affected side. All the participants were examined for CMAP latency, CMAP amplitude, and CMAP nerve conduction velocity (NCV) of radial nerve at the baseline and after completion of four weeks.

Results: The experimental group demonstrated significant increase in the amplitude of the forearm-EIP segment ($t = 3.426$, $p < 0.006$) and a significant reduction in the latency of the spiral groove-EIP segment ($t = 2.212$, $p < 0.049$). The control group also exhibited significant improvements in amplitude, particularly in the elbow-EIP segment ($t = 2.204$, $p < 0.052$) and the spiral groove-EIP segment ($t = 0.981$, $p < 0.0349$). However, no significant changes were observed in nerve conduction velocity across any of the examined segments, either within groups (pre-post intervention) or between the experimental and control groups.

Conclusion: The findings of the study suggest that both the experimental and control groups demonstrated improvements in CMAP latency and CMAP amplitude of the radial nerve. However, these improvements were not consistently observed across all segments of the nerve.