E-Poster

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Lower Extremity Rehabilitation after Stroke using Brain-Computer Interface Treatment

Topic: Miscellaneous

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BACKGROUND

Brain-Computer Interface (BCI)-based neurorehabilitation has shown significant potential for improving recovery in stroke patients. Previous studies indicate that BCI interventions are particularly beneficial for individuals in the chronic phase of stroke and those with severe hemiparesis—populations that often face challenges with conventional rehabilitation methods.

METHODS

Seven chronic stroke patients with lower extremity hemiparesis were recruited to participate in 25 BCI sessions, conducted approximately three times per week. The BCI system was designed to facilitate Motor Imagery (MI)-based control of paretic ankle dorsiflexion and healthy wrist dorsiflexion, combined with Functional Electrical Stimulation (FES) and avatar feedback. Functional assessments were performed before and after the intervention, utilizing the following measures: the 10-Meter Walk Test (10MWT), ankle dorsiflexion Range of Motion (ROM), and the Timed Up and Go (TUG) test.

RESULTS

Significant improvements were observed following the intervention. Gait speed, as measured by the fast-velocity 10MWT, improved by -0.71 seconds [-6.2 to -0.5], p = 0.031—exceeding the minimally clinically important difference. TUG performance also showed a significant enhancement, with a reduction of -2.7 seconds [-11.6 to -2.6], p = 0.002. Additionally, active ankle dorsiflexion ROM increased by 4.7° [1.7 to 7.4], p = 0.039.

CONCLUSION

These findings demonstrate the feasibility of this BCI-based approach and contribute to the growing evidence supporting its potential for gait rehabilitation in stroke patients. However, given the small sample size, further research with larger cohorts is needed to validate these results and confirm the broader applicability of this method.

Statement of Disclosures

G.tec medical engineering is a medical device company and both the developer and distributor of the brain-computer interface technology used.

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