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Impact of different EMG normalisation methods on muscle activations and cocontraction index in adults with chronic post-stroke hemiparesis.

EMG normalisation is a key step to draw definite conclusions on physiologically standardized data. In the absence of a consensus in scientific literature, recommendations would be useful for the choice of EMG normalisation method in patients, such as hemiparetics, who present atypical EMG patterns during motor behavior. The aim of this work was to compare muscle activations and cocontraction index (CCI) using different EMG normalisation methods during active elbow extension in healthy participants and patients with chronic post-stroke hemiparesis.

Four adults with chronic post-stroke hemiparesis (Hemi) and five healthy participants (Co) were included. Elbow kinematics and EMG activity of elbow flexors and triceps brachii were recorded during active elbow extensions performed at spontaneous speed. EMG signal was normalised in reference to EMG activity recorded during isometric or isokinetic MVC. Normalised EMG during elbow extension was used to compute muscle activations and CCI, during the acceleration and deceleration phases. Friedman tests were performed with two factors (group and normalisation).

No differences were found between normalisation methods neither for muscle activations and for the cocontraction index in Co and Hemi groups. Greater muscle activations were found in Hemi vs Co (24.2±13.4% vs 4.3±3% and 52.4±33.2% vs 6.2±4.3% during acceleration and deceleration phase, respectively). Cocontraction index in acceleration phase was greater in Hemi

vs Co ($p<0.05$), and in Co between acceleration and decceleration phases ($p<0.05$) (Fig.1).

Even if isokinetic MVC-based EMG normalisation accounts for the influence of angle- and velocity-torque relationships, our results on EMG activations and cocontraction index support the use of isometric instead of isokinetic MVC normalisation, and further suggest the need to take into account individual muscle activations to better understand differences in cocontraction between groups and phases.

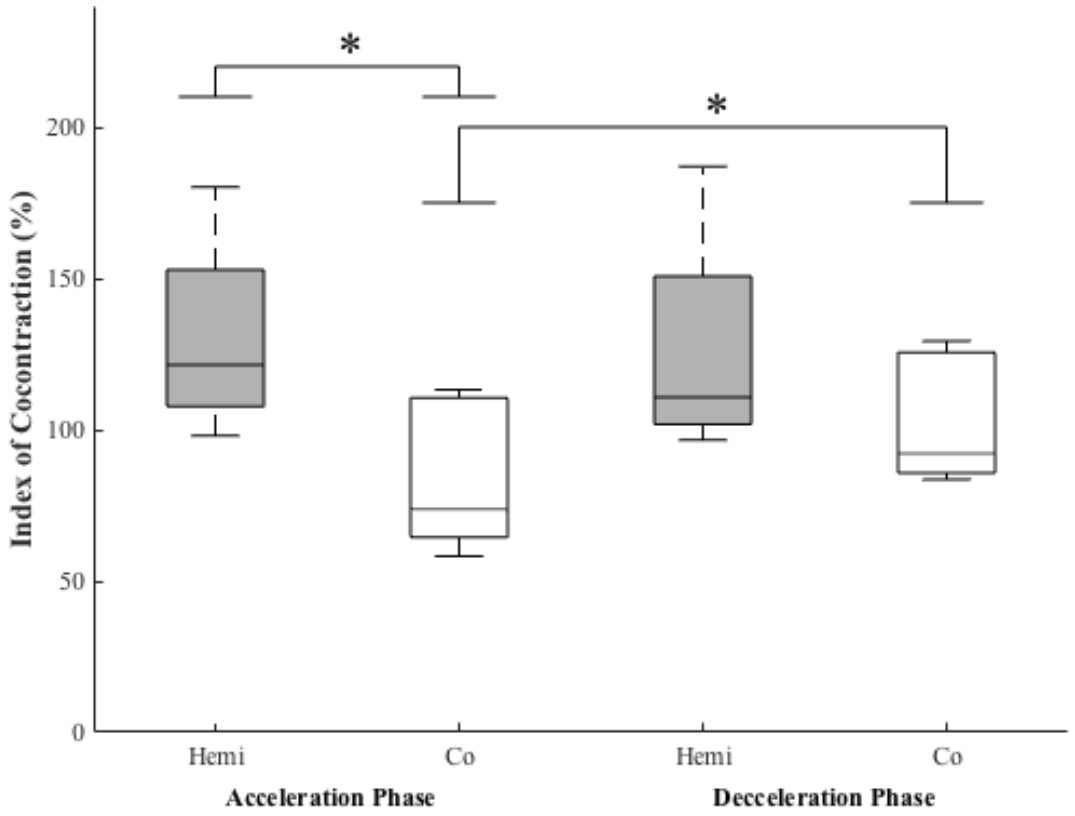

Figure 1. Representative Index of cocontraction for hemiparetic (Hemi,grey) and control groups (Co,white) for acceleration (left) and decceleration (right) phase. * - statistically significant difference at $p < 0.05$

Abstract topics : C1.7 Diagnosis and Assessment of Neurological, Musculoskeletal and Movement Related Functions (including Gait Analysis, Posturography)