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Is spasticity or spastic cocontraction of the elbow flexors associated with the limitation of voluntary elbow extension in adults with acquired hemiparesis?

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Introduction/Background Muscle overactivity, including spasticity and spastic cocontraction, is an involuntary motor unit recruitment participating in the spastic paresis syndrome after cerebral injury. Spasticity is defined as velocity-dependent increase in tonic stretch reflexes. Spastic cocontraction refers to increased antagonist muscles recruitment triggered by the volitional command of agonist muscles. This study aimed to clarify the association between spasticity and spastic cocontraction of elbow flexors and to study their contribution to the limitation of active elbow extension in hemiparetic adults.

Material and method Ten adults with acquired hemiparesis and ten healthy participants were included. Surface EMG recorded from elbow muscles during elbow isometric extension contractions was used to compute the index of cocontraction (ICC) for each participant, while spasticity, limitation of active elbow extension, and upper extremity Fugl-Meyer Assessment (FMA-UE) score were obtained in hemiparetic participants. Non-parametric Spearman correlations were performed to investigate the relationship between ICC and (i) limitation of active elbow extension, (ii) elbow flexors spasticity and (iii) FMA-UE.

Results Our results showed significant ICC in three hemiparetic participants compared with healthy participants, and significant associations between cocontraction and (i) active elbow extension limitation ($r_s = 0.81, P < 0.001$) and (ii) Fugl-Meyer Assessment score ($r_s = 0.53, P = 0.017$) in hemiparetic participants. No significant correlation was found between spasticity and active elbow extension limitation.

Conclusion Our results are the first to show that spastic cocontraction directly contributes to elbow extension deficit in adults with acquired hemiparesis, and further confirm that spasticity and spastic cocontraction have different functional repercussions with regards to impaired motor function. Our findings support the conclusion that spastic cocontraction, rather than spasticity, has significant repercussions on impaired active motor function in hemiparetic adults. Therapeutic innovations should be directed toward reduction of spastic cocontraction to improve motor function in acquired hemiparesis.

Keywords Upper limb; Muscle hypertonia; Hemiplegia

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Knee function deficiencies evolves as osteoarthritic radiographic severity increases

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Introduction/Background Previous studies shown that mechanical factors can be valuable biomarkers to help as a diagnostic aid, risk indicator of osteoarthritis (OA) progression and to be useful in guiding and monitoring treatments. Since the relationship between radiographic Kellgren-Lawrence (KL) grades and knee biomechanics is and not well understood, the study aims at assessing how knee kinematics differ with increasing KL grade.

Material and method This cross-sectional study was carried out in Quebec, Canada primary care clinics. Knee OA patients with KL grade ≥ 2 and with pain ≥ 4/10 were recruited. Sociodemographic