MEASUREMENT OF MUSCLE STIFFNESS USING ROBOTIC ASSISTED GAIT ORTHOSIS IN CHILDREN WITH CEREBRAL PALSY: A PROOF OF CONCEPT.

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ABSTRACT

PURPOSE: To evaluate the feasibility and reliability of a novel stiffness assessment tool implemented in the driven gait orthosis Paediatric Lokomat; to investigate the influence of single robotic-assisted gait training (RAGT) on muscle stiffness in children with cerebral palsy (CP).

METHODS: Ten children with spastic CP conducted a single standard RAGT session and stiffness was assessed before and after the RAGT. Nine of the ten subjects were tested twice on the same day to investigate test-retest reliability, intraclass correlation coefficients (ICCs), standard error of measurement (SEM), coefficient of variation of the method error (CV(ME)) and resistive torques during passive leg movements (stiffness in Nm/°) were calculated.

RESULTS: ICCs showed high reliability (0.83-0.97) for hip and knee movements. SEM and CV(ME) indicated 0.028-0.085 Nm/°, 9.5-23.0% of test-retest variability in hip and 0.018-0.064 Nm/°, 13.3-43.5% in knee measures. Using the assessment tool, a significant decrease in muscle stiffness in participants, especially in children with high levels of muscle tone, could be shown after a single session of RAGT.

CONCLUSIONS: The assessment tool L-STIFF is a feasible tool for automated measurement of stiffness in children with CP, but it is not sensitive enough to record small changes in muscle tone.

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