
Presented at International Society of Kinesiology and ElectroPhysiology, Quebec City, Canada. June 22-25, 2022

(Manuscript in submission)

O9.4 Quantifying Changes in Postural Control Related to Robotic Gait Trainer Use from Home Video Data

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BACKGROUND AND AIM: Head control is a widespread issue for children with significant mobility impairments. The inability to control posture can affect many aspects of life that are necessary for learning and development, such as maintaining eye-contact. There are currently no effective interventions for these children to improve head control. A new robotic gait trainer (the Trexo) improved head control in a case study. This study involves using video data to evaluate changes in head control associated with use of the Trexo robotic gait trainer.

METHODS: We asked participants in a prospective trial observing the impacts of Trexo use to film short videos in the frontal plane while using the robotic gait trainer periodically at baseline, after one month of training and after three months. Only those with non-progressive causes of disability were included in this study. Kinematic motion analysis software was used to determine the maximum head angle from vertical in the frontal plane based on frame by frame tracking. To mitigate any error associated with the home video frame of reference, a perspective grid was built on the walker to define horizontal and vertical. Previous research has found children walk with a mean (std) maximum head angle from vertical of 4.10 (12.93) degrees. A Wilcoxon Signed Rank test was used to determine if changes are statistically significant ($\alpha=0.05$).

RESULTS: Qualitatively, almost all participants demonstrated poor head control such as extreme neck

flexion/extension in the sagittal plane, involuntary movement, as well as the need to rest the head at the end range of motion for extended periods of time. 4 of 10 participants who submitted videos at two or more time points were ineligible for quantitative data analysis as they required the additional support of a cervical collar. The maximum head angle from vertical at the first time point (baseline or 1 month) in the remaining 6 participants ranged from 27-118 degrees, all beyond 1 standard deviation above the mean in typically developing children. After 1-3 months of training, all participants' head control improved by a mean (range) of 15 (4-39) degrees, $p=0.028$.

CONCLUSIONS: All children using a Trexo robotic gait trainer had impairments in head control. Training consistently resulted in improved head control in those whose maximum head angle could be evaluated. These results suggest robotic gait training is a novel rehabilitation strategy to help improve head control in children with mobility impairments.