INTRODUCTION

Individuals with hemiparesis due to stroke exhibit decreased ankle joint power generation in the affected limb during walking [1]. This likely contributes to:

- Asymmetric forward propulsion [2]
- Impaired swing leg initiation [3]
- Within and across limb compensations [4]
- Decreased self-selected walking speed [1,5]
- Elevated metabolic cost of walking [5]

"Restoring normal ankle mechanics in people with stroke may improve gait outcomes"***

PURPOSE

Test the feasibility of a user-controlled powered exoskeleton for enhancing paretic ankle joint mechanics during treadmill walking

METHODS

5 Subjects with hemiparetic stroke

Time since stroke = 171.6 ± 118.7 months
Preferred walking speed = 0.84 ± 0.21 m/s

Treadmill walking conditions

(5 mins each @ 75% of Preferred speed)
- without exoskeleton (NoEXO)
- with exoskeleton unpowered (NoPOW)
- x3 with exoskeleton powered (POW)

Data analysis:

- 3D lower limb mechanics
- Electromyography (soleus)
- Metabolic energy estimates

RESULTS (N = 5)

Non significant 9.0% increase of peak plantar flexion power with exoskeleton (POWx3 vs NoEXO, p = .83)

No significant effect of exoskeleton on metabolics (p = .21), but gradual training effect is evident

CONCLUSIONS

A user-controlled exoskeleton can enhance paretic ankle plantar flexion moment.

With repeated training sessions, we expect to see further increase in ankle joint moment and power output, improvement in lower limb mechanical symmetry, and reduction in metabolic cost of walking.

REFERENCES


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