

A PILOT INVESTIGATION INTO THE RELATIONSHIP BETWEEN LEG POWER AND WALKING SPEED IN INDIVIDUALS WITH ACQUIRED BRAIN INJURY

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Introduction: Following acquired brain injury (ABI), movement problems increase the effort required for walking and reduce walking speed. Previous studies indicate a link between muscle strength and walking speed in individuals with ABI.¹ However a stronger correlation between walking speed and leg power, than walking speed and leg strength has been described in other clinical groups.² The relationship between leg extensor power (LEP) and walking performance has not been investigated in neurological populations.

Objective: This pilot study investigates the relationship between LEP and walking performance in individuals with ABI.

Design: Prospective experimental.

Methods: After giving informed consent, a convenience sample of 14 individuals with ABI, receiving inpatient rehabilitation, was recruited. Inclusion criteria were a Rivermead Mobility Index of six or above and the ability to walk for at five minutes. Following familiarisation, LEP was measured in both legs using a LEP rig and gait parameters, including speed, cadence and stride length, using the GAITRite® system. Data met the assumptions for parametric testing.

Results: Participants had a mean age \pm SD of 49 ± 7.5 years and mean time since injury \pm SD of 278 ± 107 days. A moderate ($r=0.522$; 95% CI $-0.013 - 0.824$) but not significant ($p=0.055$) relationship was found between LEP/kg of the weaker leg and walking speed. A significant moderate positive correlation was found between the weaker LEP/kg and stride length ($r=0.538$, 95% CI $0.009 - 0.831$, $p=0.047$). There was a significant high negative correlation between the percentage difference between the weaker and stronger side LEP and self-selected walking speed ($r=-0.763$, 95% CI $-0.39 - -0.921$, $p=0.023$).

Discussion: LEP is measurable in individuals with ABI. We found LEP of the weaker leg moderately correlated with self-selected walking speed and stride length and the degree of imbalance between left and right LEP negatively correlated with walking speed. The effect of a targeted power training intervention on walking in this group should be investigated.

References

1. Bohannon, R.W. and Andrews A.W. (1990) Correlation of knee extensor muscle torque and spasticity with gait speed in patients with stroke. *Archives of Physical Medicine and Rehabilitation* 71 (5) 330-333.
2. Bean, J. F., Kiely, D. K., Herman, S., Leveille, S. G., Mizer, K, Frontera, W. R. and Fielding, R. A. (2002). The relationship between leg power and physical performance in mobility-limited older people. *Journal of the American Geriatric Society*, 50 (3) 461-7.