Unmasking Gait Impairments in Individuals with Neurological Conditions

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BACKGROUND

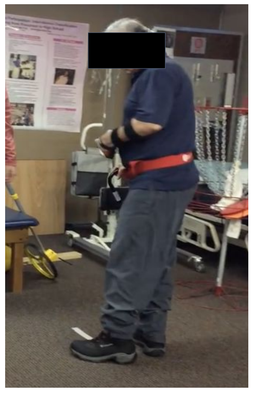
- As patients recover from neurological conditions, improvements are often seen in forward gait. Some of the common outcome measures used in the clinical setting to assess forward gait include the 10 meter walk test (10MWT), the Timed Up and Go (TUG) and the 6 minute walk test (6MWT). However, although these tests look at forward walking, **walking in everyday life does not always strictly consist of walking in a straight line.** In order to maneuver and manage daily environments, individuals must step in multiple directions.
- Lack of dynamic control is a key impairment associated with neurological disorders such as PD and dynamic activities like tandem gait are more likely to bring to light impairments that simple static activities wouldn't find.[1,2] Also, compared to forward walking, patients following a stroke demonstrated decreased cadence and gait speed as well as increased need for upper extremity support with backwards walking.[3]
- Our study will further look to determine whether or not dynamic forms of gait such as tandem walking and backwards walking will find increased gait impairments compared to normal outcome measures used in clinical settings.

PURPOSE

- The purpose of this study was to explore the effects of backwards walking and tandem beam walking on its ability to unmask gait impairments in individuals with neurological conditions.
- Hypothesis: Patients with chronic neurological issues will demonstrate greater gait impairment with tandem gait and backward walking as measured by hand and foot errors and decreased speed.

MATERIALS AND METHODS

Five patients with neurological impairments (3 post CVA, 1 MS, 1 post brain tumor resection) form the Bradley University Clinic for Fitness and Function were recruited for this study. Before and after 10 weeks of physical therapy, data was collected on each of the patient's ability to perform the TUG, and 10 MWT. Data was also collected on each participant on their ability to walk tandem on a beam and walk backwards for 10 meters. Three trials for both tandem and backwards walking were averaged. Post physical therapy data was used for the analysis. Hand and foot errors were counted for each trial as well as time needed to perform each test. Data was then compared with the results from three non-impaired age-matched controls. Aged-matched controls did not demonstrate any stepping errors, thus errors were not calculated in the percent difference.

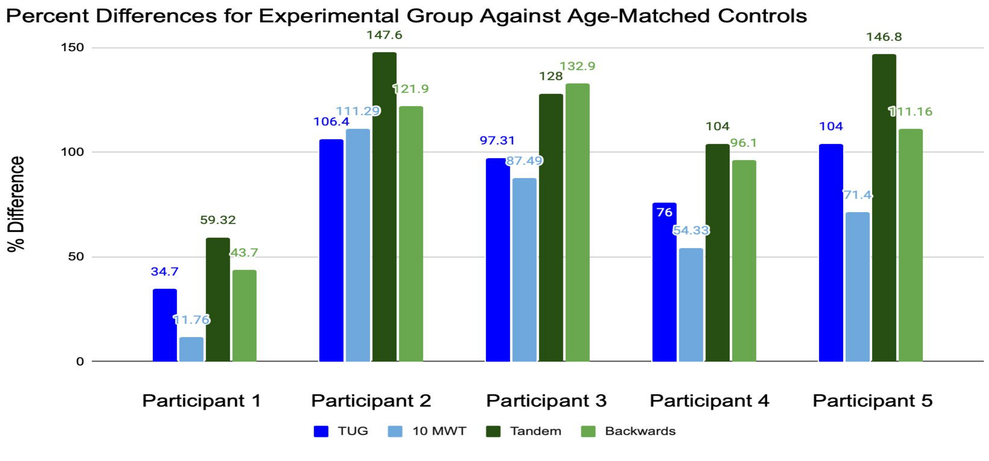


PERCENT DIFFERENCE CALCULATION:

% diff = 100 x (|A-B| / (A+B)/2)

A = group with impairments and B = age-matched control group. Percent difference was applied to task speed

RESULTS



Percent difference between the experimental group post-clinic vs. age-matched controls were used to compare results. Average percent difference for 10MWT and TUG were 67% and 84%, respectively. Average percent difference for tandem walking and backwards walking were 117% and 101%, respectively.

CONCLUSIONS

- The larger percentage differences in average tandem and backward walking indicate that these tasks demonstrate a greater impairment in gait function compared to traditional forward-walking tasks.
- Normal bipedal locomotion in community activities require stepping with a narrow base of support and stepping in directions other than forward. Tandem and backward walking represent these functional stepping requirements that are seen in daily activities.
- Our results add to our understanding the need for high-intensity gait training in multiple locomotor tasks when providing physical therapy to individuals with neurological impairments.
- Future studies in this topic would benefit from the usage of a larger sample size, a 6-month follow up with all subjects, closer age-matched controls to each subject, and targeted gait interventions amongst all participants in the pro bono clinic.

REFERENCES

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