THE EFFECT OF ASSISTIVE DEVICES ON GAIT PATTERNS IN PARKINSON’S DISEASE
A PILOT STUDY

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INTRODUCTION

o As suggested by recent studies people with Parkinson’s disease (PwPD) experience balance and gait disorders as a consequence of disease progression.1,5
o These mobility impairments can cause frequent falls and limitation in activities of daily living (ADL).1,2
o Falls typically occur while a person is turning, initiating gait, and sitting down.3,4
o The use of assistive devices (ADs) have proven to be a crucial strategy to maintaining stability during gait and the main form of adjunctive treatment for most individuals.1,2
o The information available in the literature on how PwPD modify their gait characteristics when using different ADs is still scarce.3,5

The purpose of our study is to assess the influence of six different ADs on gait patterns in PwPD.

METHODS

15 Participants

Inclusion Criteria

o 2.8 years old;

o Diagnosis of idiopathic Parkinson’s disease (IPD);

o Ambulate independently (minimum 10m without assistance);

o Use of anti-parkinsonian medication.

Exclusion Criteria

o Significant cognitive impairment, Mini-Mental State Exame (MMSE) ≤24;

o Psychiatric, neurological, visual or orthopedic disorders that enables participants to perform the required tests.

Equipment and Measures

Participants were asked to walk across a 2’ by 16’ Zeno walkway mat. (ProtoKinetics, Havertown, PA)*

o The Zeno walkway is computerized and has sensors arranged in a grid-like pattern to identify the pressure applied by each foot as it steps.

o The software program calculates multiple spatio-temporal parameters of the person’s gait, average across all steps for a particular trial.

Study Design

Prospective, single-center, pilot study;

Conducted following a Case Report Form (CRF);

Postural stability was assessed and rated accordingly to the item 3.12 of the Movement Disorder Society-Unified Parkinson’s Disease Rating Scale (MDS-UPDRS);

Order of testing assistive devices (randomized).

Procedures

FIRST COURSE – Straight Line

o Walking at a self-selected, comfortable pace;

4 paths: Only the mean of the last 3 paths was calculated and analysed (first path was a trial).

SECOND COURSE – Clinical test*

o Walking fast, to test manoeuvrability around obstacles, performing Timed Up and Go test (TUG);

2 paths: Only the second path was analysed (first path was a trial).

RESULTS

Resembling previous studies the reported results reflect immediate effects because we did not provide any professional instruction to prevent gait modification from clinician feedback.

Table 1. Participants characteristics

Characteristics | Mean ± SD
---|---
Age (years) | 62.22 ± 7.5
Height (m) | 1.62 ± 0.08
Weight (kg) | 72.59 ± 13.83
BMI (kg/m²) | 27.5 ± 6
Years of PD (years) | 8.54 ± 4.4
MMSE | 28 ± 1

Analysis of differences between ADs and baseline walking conditions showed that:

- 4WW was the only AD that showed no impact in gait measures and was also the only one that actually improved the relation between stance and swing phase;
- NWS and Cane were the ones that followed, respectively:
  - Both did not show significant changes in stance and swing phase;
  - Both resulted in different velocity and cadence, but NWS also differed in stride time (p=0.025) while Cane differed in total double support (p=0.034);
- 2WW and TCane differed in almost all gait parameters with exception of stride time and cadence for 2WW, and stride length for TCane;
- 5WW showed the highest variability with differences in all gait measures.

In conclusion, we found that the use of different ADs in PwPD seem to be associated with different gait patterns.

Discussion

o Based on previous findings we hypothesize that:
  - Wheeled walkers should be favored when compared to non-wheeled walkers because they are easy to manipulate and do not require stopping and lifting the walker forward.
  - Our results were in agreement with previous findings that:
    - Demonstrated 4WW as the AD with least impact in gait pattern on individuals’ abilities to walk at their usual speed;
    - Showed 5WW as the AD producing the slowest and most variable gait pattern of all ADs when walking straight.
  - Our study confirms that use of 4WW, NWS, and Cane could improve ADs in PwPD resulting in a closer reach to the normal values of gait velocity and gait pattern, and the ability to maintain a comfortable pace.

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FUTURE WORK

- Include the analyze of recorded freezing episodes; anxiety and/or panic attack; stumbling and/or falls; patient level of satisfaction; perception of feeling safe and the second course data.

- Enlarge the sample to observe more in depth effects.

- Design a study to observe gait changes after a considerable period of specific training when walking with these ADs and with a laser AD.

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BIBLIOGRAPHY


Figure 1. Courses

Figure 2. Gait cycle

Figure 3. Gait measures across all walking conditions: (SD)