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ORIGINAL ARTICLE

Determinants of Use of a Walking Device in Persons With Parkinson's Disease

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Abstract

Objective: To identify determinants for the use of a walking device in persons with Parkinson's disease (PD).

Design: Cross-sectional study of participants with PD.

Setting: Laboratory.

Participants: Persons with PD (N=85; 60 men) were studied. Their mean age was 69.4±8.9 years. The average time since diagnosis was 7.9±5.3 years.

Interventions: Not applicable.

Main Outcome Measures: Age, sex, disease duration, disease severity, and motor impairment were recorded. Participants were asked whether they usually used any walking device (eg, cane or walker) and were categorized as either an "independent walker" or a "device walker." Clinical balance measures including functional reach, turn duration, 5-meter timed Up and Go (5m-TUG) test, and Activities-specific Balance Confidence (ABC) scale were investigated for their contribution to the prediction of walking with a device.

Results: Thirty-one participants (36.5%) reported that they usually used a walking device. Classification and regression tree analysis determined that the 5m-TUG test and the ABC scale were important factors in differentiating participants who used a walking device from those who did not. Critical thresholds included 13 seconds for the 5m-TUG test and a score of 75 for the ABC scale in determining device walking. Using only these 2 determinants, the classification and regression tree model correctly classified 81% of the patients as either independent or needing a walking device.

Conclusion: The 5m-TUG test and the ABC scale may be useful in clinical assessments of the need for a walking device in persons with PD. Archives of Physical Medicine and Rehabilitation 2014;95:1940-5

Gait deficits in persons with Parkinson's disease (PD) are common and inevitable problems, especially as the disease progresses. These are unlikely to be completely reversed by medical and surgical treatments. Therefore, ambulatory devices are eventually needed as an adjunctive intervention. Ambulatory devices allow persons with PD to better cope with their walking difficulties, maintain their activities of daily living (ADL), and be more independent.

Ambulatory devices including canes, standard walkers, front-wheeled walkers, 4-wheeled walkers, and walking stabilizers are prescribed for persons with PD to improve mobility, maintain balance, and possibly prevent or reduce falls. These devices can increase confidence and sense of safety, which can raise a person's level of mobility and independence.[1-3] The use of an ambulatory device increases the base of support, thereby allowing a greater range for the center of mass motion to be tolerated.[4-6] Ambulatory devices also prevent loss of balance or instability by allowing stabilizing reaction forces such as holding on to an object or pushing against the ground.[7] Motorized devices such as power wheelchairs and scooters are used by persons with PD who

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have impairments that severely limit their mobility and who are unable to ambulate because of freezing, poor endurance, and/or instability.[1]

Many factors are involved in determining whether a person with PD is an appropriate candidate for a walking device. These considerations are gait and balance impairments, cognitive function, vision, and the living environment.[8] Most health care providers who prescribe ambulatory devices use their clinical judgment based on interviews and motor examinations but without using any scientific guideline for recommending walking aids. Currently, there is no available clinical measure that can serve as a guideline for recommending the use of a walking device. The purpose of this study was to identify clinical measures and optimal cutoff points that best differentiate device walkers from independent walkers in a sample of community-dwelling persons with PD. Identification of quantitative, clinically meaningful measures and cutoff points may help clinicians decide whether to recommend the use of a walking device.

Methods

Participants

Eighty-five persons (60 men) with PD were studied after they agreed to participate in the study and signed the approved consent form. The participants were recruited from movement disorder clinics in Houston and Galveston, TX. All participants reported that they experienced gait and balance problems from PD; however, they were able to stand and walk independently. All participants were able to perform all tests without using any walking device. Participants were screened for significant cognitive impairment with the Neurobehavioral Cognitive Status Examination (Cognistat), and any subtest score in the severely impaired range resulted in study exclusion.[9] The study was approved by the Institutional Review Board for Human Subject Research for Baylor College of Medicine and Affiliated Hospitals and the University of Texas Medical Branch.

Measures

Demographic data including age, sex, and disease duration were recorded. The Unified Parkinson's Disease Rating Scale[10] and the Hoehn and Yahr (HY) Scale[11] were scored by a neurologist. The Unified Parkinson's Disease Rating Scale was used to describe motor impairment. This standardized rating scale assesses the degree of an individual's impairment from PD and consists of subscales on mentation, ADL, motor examination, and therapeutic complications, with higher scores indicating greater impairment.[10] The HY Staging Scale was used to rate the severity of PD. The scale stages the progression or severity of the disease on a 5-point scale. A particular HY stage describes where an individual is, in the possible progression of the disease.[11] The Postural Instability and Gait Disorder subscale score of the Unified Parkinson's Disease Rating Scale was calculated by adding scores of 5 items—falling, freezing, walking, gait, and postural stability—to represent clinical mobility and stability.[12] Participants were asked whether they usually walked with or without an assistive device. Walking devices could include canes and walkers (with or without wheels). Device walkers included participants who reported using any one of these devices. They were categorized as independent walkers if they responded that they usually walked without any walking device. Wheelchair users were excluded from the study.

List of abbreviations:

ABC	Activities-specific Balance Confidence
ADL	activities of daily living
FoF	fear of falling
HY	Hoehn and Yahr
5m-TUG	5-meter timed Up and Go
PD	Parkinson's disease

Balance confidence and fear of falling

The Activities-specific Balance Confidence (ABC) scale was used to estimate the fear of falling (FoF). The ABC scale was developed to assess participants' balance confidence, a construct similar to the FoF.[13] Participants were asked to rate their self-perceived balance confidence level from 0 (no confidence) to 100 (complete confidence) in performing 16 ADLs. The mean score across all 16 activities was calculated and used to estimate the level of FoF. A lower mean ABC scale score indicates a higher level of FoF.

Clinical measures of balance and mobility

Timed tests to measure balance included the timed 5-step test, time to turn, and the 5-meter timed Up and Go (5m-TUG) test. For the timed 5-step test, the participants were timed while stepping up and back down an 8.8-cm step 5 times. For the turn duration test, the participants were timed while performing a 360° turn. Turn duration was performed toward both the left and the right. The average of the 2 directions was used in data analysis. For the 5m-TUG test, participants were asked to get up from a chair, walk forward for 5m, turn around, and walk back to sit on the same chair as fast as possible. A line on the floor was used to mark the walking distance at 5m from the chair. The functional reach test was used to estimate the risk of falling. Participants were asked to reach their arm as far forward as possible without moving their feet or losing their balance. The distance of their forward reaching was measured.

Procedure

All participants read and signed an approved consent form by Baylor College of Medicine and University of Texas Medical Branch Institutional Review Boards before participation. All clinical assessments and testing were performed when the participants were in the optimal "on" medication state, approximately an hour after taking their dopaminergic medication. They were assessed for disease severity using the HY Scale and the Unified Parkinson's Disease Rating Scale motor section by a neurologist before completing the ABC scale and performing the clinical balance tests. One tester performed clinical balance tests, and 1 research assistant provided guarding to prevent falls. All balance tests were performed twice and their averages were used in data analysis. All participants wore a gait belt and performed all tests without using any walking device. They were allowed to push the chair to get up for the 5m-TUG test, if needed.

Statistical analysis

All analyses were performed using IBM SPSS (version 21).[a] Participant characteristics and clinical variables were descriptively analyzed. Chi-square tests were performed to assess the associations of device walking status (with or without device) with sex and marital status. Spearman rho correlations were used to determine the strengths of association between other variables and