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LOCOMOTOR BEHAVIOR OF FALLERS AND NON-FALLERS PATIENTS WITH PARKINSON'S DISEASE.

¹André Macari Baptista, ¹Rodrigo Vitório, ¹Ellen Lirani-Silva, ¹Claudia Teixeira-Arroyo, ¹Lilian Teresa Bucken Gobbi

¹Universidade Estadual Paulista "Júlio de Mesquita Filho" Campus Rio Claro - São Paulo/Brazil;

email: andre_macari00@hotmail.com

INTRODUCTION

In Brazil, Parkinson's disease (PD) affects 3.3% of individuals older than 64 years [1]. PD is a neurodegenerative pathology characterized by progressive degeneration of the dopamine-containing neurons in the *substantia nigra pars compacta*. People with PD show motor disturbances such as locomotor impairments and postural instability. As a consequence, PD patients demonstrate a high incidence of falls [2]. Researchers have sought to identify risk factors that may be associated with falls in PD. It has been shown that locomotor impairments are one of major causes of falls in PD. The locomotor differences between fallers and non-fallers PD patients are not fully understood. A more detailed understanding of the locomotor differences between fallers and non-fallers can serve as an important tool for better design of interventions in order to prevent and/or reduce the occurrence of falls in PD. The aim of current study was to compare the locomotor behavior on even terrain between fallers and non-fallers PD patients.

METHODS

Thirty-six patients with idiopathic PD volunteered to participate in the study. Initially, fall occurrence was registered during a 4-month period by weekly interviews (personal contact and/or phone calls). These data were used to assign subjects into two groups: fallers (n=12) and non-fallers (n=24). Then, the participants were assessed, in a typically medicated state, by clinical rates, Hoehn & Yahr Rating Scale (H&Y) and the Unified Parkinson's Disease Rating Scale (UPDRS), and the spatiotemporal parameters of self-paced walking. Higher scores on the UPDRS and H&Y signify higher deficit levels of the disease. The walking task required participants to walk, at self-selected pace, across an 8m pathway. Three trials were recorded with an optoelectronic 3-D system. Outcome measures included spatiotemporal parameters of gait. Student t tests were carried out to examine for between group differences. The p-value was set at 0.05

RESULTS AND DISCUSSION

From the 36 people with a diagnosis of PD who volunteered for the project, 12 reported at least one fall during the 4-month period of fall assessment; five of them reported recurrent falls. A total of 25 falls was reported. The two groups (fallers and non-fallers) were not significantly different for age (fallers: 67.7±6.7 years; non-fallers: 66.1±9.9 years; p = 0.61), body height (fallers: 156±10.3

cm; non-fallers: 161,6±8 cm; p = 0.08), and body mass (fallers: 64.6±15.1 kg; non-fallers: 72.4±11.3 kg; p = 0.09). Fallers had greater score on UPDRS-III than non-fallers (respectively, 25.9±10 and 19.7±6.6; p = 0.02); in other words, fallers showed more severe disease-related motor impairments than non-fallers patients. In addition, fallers walked with shorter stride length than did the non-fallers (Table 1).

Table 1: Means and standard deviations of dependent variables for each group.

Dependent variables	Fallers	Non-fallers	p
Stride length (cm)	98.7±25.5	116.3±16.6	0.02
Stride duration (s)	1.04±0.1	1.05±0.1	0.61
Stride velocity (cm/s)	96.7±27.1	111.7±20.2	0.07
Double support phase (%)	25.5±6.4	22±4.4	0.06
Cadence (steps/minute)	115.4±9.3	114±9.4	0.69

Although it did not reach statistical significance, fallers PD patients demonstrate a trend to walk slower and with increased double support phase, which could be interpreted as a strategy to compensate postural instability or fear of falling. On the whole, current study demonstrated that more severe disease-related motor impairments (measured by the UPDRS-III) and hypometric gait are related to fall occurrence in people with PD. In agreement, previous studies have demonstrated that fall occurrence in PD is influenced by disease severity [2,3]. Current findings can help to design non-pharmacological interventions (i.e. exercise programs) aiming to reduce or to avoid fall occurrence in people with PD. Future studies are encouraged in order to examine the effectiveness of spatial-temporal parameters of gait to predict falls in PD.

CONCLUSIONS

The results suggest that hypometric stride length is associated with the occurrence of falls in PD.

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