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Gait Analysis of Idiopathic Parkinson's Disease and Other Parkinsonism : Preliminary study

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Objective

It is a challenge to distinguish Idiopathic Parkinson's Disease (IPD) since it shares symptoms with a number of other diseases commonly referred to as Parkinsonism such as atypical and secondary Parkinsonism, despite differences in etiology and course of treatment. There is growing interest in having objective assessment of disease using technology-based devices that provide unbiased measurements which can be used in clinical practice. The aim of this study was to compare and quantify spatiotemporal and kinematic gait parameters obtained by gait analysis (GA) in a group of IPD patients compared with parkinsonism other than IPD. **Material and methods** Patients who visited the center of neurology or rehabilitation with feature of parkinsonism were recruited from Single University Hospital. We identified patients with the most convincing diagnosis of IPD or parkinsonism other than IPD at hospital discharge by neurologic specialists of Parkinsonism. The level of functional disability was determined using the Unified Parkinson's Disease Rating Scale (UPDRS) and the Hoehn and Yahr (H&Y) scale by neurologist. Gait analysis(GA) was performed on a force platform (Zebris Medical GmbH, Isny, Germany). The spatiotemporal parameters were estimated from the vertical pressures. All the experiments were conducted while the patients were in an "OFF" state. The subjects stood barefoot on the force platform for a few seconds and initiated gait at their own pace. One or two practice trials were performed before the experimental trials. Student t-test and Mann-Whitney test were conducted in the comparison of the gait parameters between IPD and Parkinsonism other than PD. All statistical analyses were performed using SPSS (SPSS, Chicago, IL). A p value ≤ 0.05 was considered statistically significant.

Result

A total thirty-five patients were recruited. We assessed fifteen IPD patients and twenty other parkinsonism patients. There was demographic data of IPD patient and other parkinsonism patient in terms of sex, age, UPDRS motor score and H&Y score in Table 1. IPD group and other parkinsonism patient did not differ statistically in terms of step length of each side, stride length, step width, stance phase of each side, swing phase of each side, double stance phase, cadence, anterior/posterior position of COP or lateral symmetry. Although, in other parkinsonism group, the difference in step length between the right and left feet was significantly higher ($p < 0.05$), as shown in Table 2.

Conclusion

This study shows that the difference of spatiotemporal parameter between IPD and parkinsonism other than IPD using GA and there was statically significant difference in

difference of step length, which is higher in other parkinsonism. The result supports that conducting the gait analysis aid to distinguish IPD from other parkinsonism and can be helpful to decide approach of treatment or predict prognosis.

Table 1. demonstrates demographic data of IPD patient and other parkinsonism patient in terms of sex, age, UPDRS motor score and H&Y score.

	Parkinsonism other than IPD	IPD
Subjects (number)	20	15
Sex (Female) (number) (%)	10 (50%)	7 (46.7%)
Age (year)	69.8±8.33	69.22±8.60
UPDRS motor score (point)	10.76±1.96	11.51±13.62
HY (scale)	2.9±0.91	2.2±0.91

Values are mean ± standard deviations, except subjects and sex.

IPD idiopathic Parkinson's disease

HY Hoehn and Yahr (H&Y) scale, *UPDRS* Unified Parkinson's Disease Rating Scale

Table 2. demonstrates spatiotemporal parameters of IPD patient and other parkinsonism patient by gait analysis. The difference in step length between the right and left feet was significantly higher in parkinsonism other than IPD group.

	Parkinsonism other than IPD	IPD
Step length (cm)		
Left	14.01±11.16	20.04±11.35
Right	14.88±9.73	20.10±10.86
Difference of Step length (cm) *	5.22±5.29	2.14±1.99
Stride length (cm)	28.98±3.70	40.15±22
Step width (cm)	17.80±3.70	16.37±3.06
Stance Phase (%)		
Left	74.21±5.37	73.05±4.68
Right	74.53±4.36	72.52±4.71
Swing phase (%)		
Left	24.78±5.37	26.94±4.68
Right	25.85±5.12	26.87±4.23
Double stance phase (%)		
Cadence (steps/min)	140.42±31.59	137.40±20.53
Anterior/Posterior Position (mm)	170.03±23.16	176.96±22.11
Lateral symmetry (mm)	13.60±9.67	13.32±9.82

Values are mean ± standard deviations

*P value < 0.05