Gait Analysis and clinical correlation in early Parkinson's Disease

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Background

Parkinson's disease (PD) is a neurodegenerative disease presenting with resting tremor bradykinesia, rigidity. Nevertheless PD patients may show an abnormal gait pattern characterized by shortened stride length, increased variability of stride, reduced walking speed and festinating gait even in the early stage of disease. Gait abnomalities occur in the development of PD; one of the most frequent anomalies is an increase variability of spatio-temporal parameters such as, stride length and step time

Materials and Methods

44 patients, admitted in Santorso Hospital from May 2012 to September 2014, affected by early stage Parkinson's disease were analyzed. We observed 23 men and 21 women, mean aged was 66,5 ± 9,11and mean disease duration was 5,2 ± 3,07 months. They underwent Unified Parkinson's Disease rating Scale (UPDRS) Part III and Hohen e Yahr scale to quantify motor symptoms and WOQ-19 italian version to evaluate non motor symptom. All partecipants were evaluated with 3D GA in the gait laboratory. Differences between participants performances and compared to normative values of control subjects preanalyzed and filed in BOX-ELITE software were examined using t test with statistical significance set at the 0.05 level

Objective

The aim of our study was hence to identify and quantify spatiotemporal and kinematic gait parameters, obteined by 3D Gait Analysis in a group of PD patients and compare them to our lab normal values

Results

The most impressive significance in temporal parameters was cadence (102.46 ± 13.17 steps/min in parkinsonian patients vs 113.84 ± 4.30 steps/min in normal subjects), followed by stride duration (1,19 ± 0,18 right limb and 1,19 ± 0,19 left limb in parkinsonian patients vs 0,426 ±0,16 right limb and 0,429±0,23 left limb in normal subjects) and stance duration. Swing phase and swing duration achived a significant difference too (p< 0,05). Spatial parameters analysis evidenced a statistically different velocity in PD patients (0,082 m/s ± 0.29) vs healty subjects (1.33 ± 0.06). Step width, stride lenght and swing velocity were remarkable significat parameters like swing velocity and average velocity.

Table 1. *Characteristics of PD patients and control group*

	PD GROUP		CONTROL GROUP	
	Male	*Female*	*Male*	*Female*
Sex	23	21	22	22
Age	63.04 ± 10.43	70.28 ± 5.48	62.02 ± 9.21	71.22 ± 4.42
L-Dopa Equivalent dose (mg)	252.17 ± 231.82	240.47 ± 193.40	-	-
Disease Onset	5.00 ± 3.38	5.42 ± 2.76	-	-
UPDRS-III score	15.00 ± 6.36	16.38 ± 4.94	-	-
Hohen & Yahr stage	1.76 ± 0.78	1.57 ± 0.63	-	-
WOQ-19	5.69 ± 3.40	6.19 ± 2.50	-	-
ADL	6.00 ± 0.00	6.00 ± 0.00	6.00 ± 0.00	6.00 ± 0.00
IADL	7.23 ± 0.69	7.17 ± 0.63	7.73 ± 0.21	7.44 ± 0.35
MMSE	27.67 ± 1.33	26.67 ± 1.30	27.5 ± 0.26	26.9 ± 1.33

Figure Legends *Characteristics and clinical parameters of Parkinson's patients and Control group to sex (Mean ± standard deviation)*

Conclusion

Our study highlighted some typical characteristics of gait in early PD. These data could mean that in early/moderate phase of the disease, starting gait is more involved than other gait phases. The deambulation disorder may be present in the early stage of PD, recognize it allows to establish an early prope medical treatment and eventual consequent rehabilitation

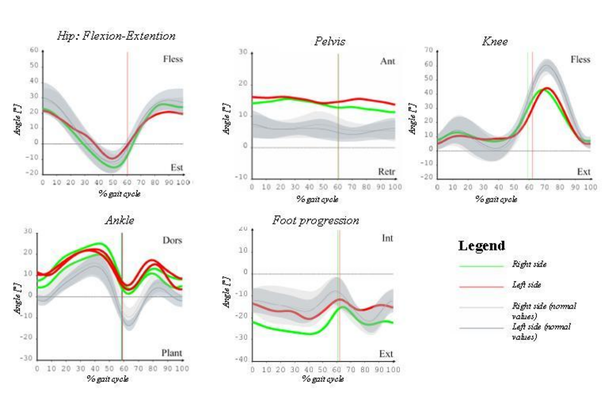

Figure 1. Walking patterns of the lowet limb joints in sagittal plane for typical PD subject of study (age:68 years) acquired under levodopa effect.

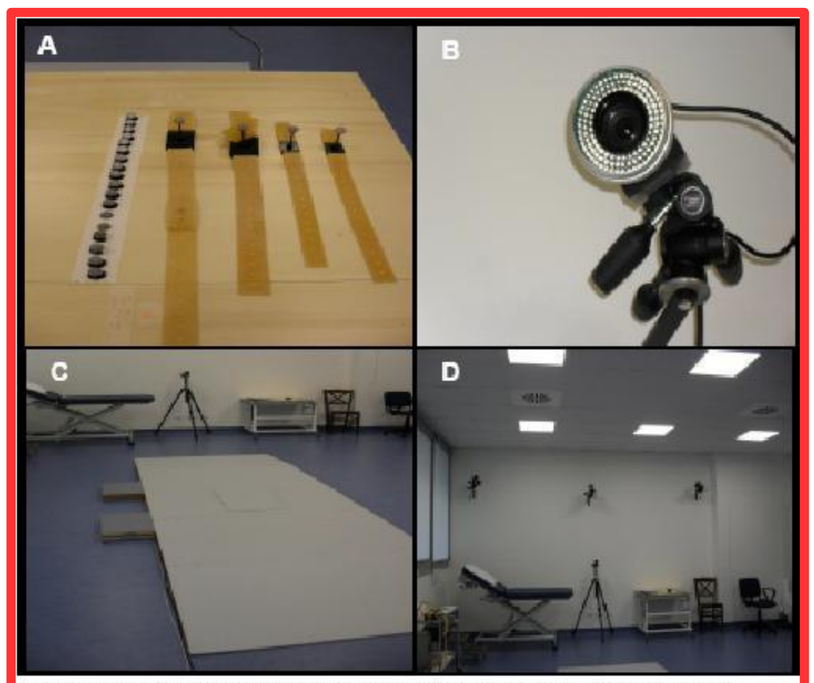

Figure 2. *(A) Position markers; (B) Infrared camera; (C) Dynamometric Platform; (D) Infrared Cameras and position Cameras.*

References

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