

INTRODUCTION

Gait deficits are common and debilitating signs of Parkinson’s disease (PD) with consequent disability, falls and reduced quality of life. The Timed Up and Go test (TUG) is a widely used clinical test which has proved to be useful for the evaluation of balance and mobility. An instrumented version of Timed Up and Go test (iTUG) has been introduced in clinical practice to provide automatic and detailed analysis of each subcomponent (sit-to-stand, gait, turning, turn-to-sit, stand-to sit), detecting kinematic parameters in order to indicate dynamic disequilibrium and increased risk of falls. Despite levodopa (LD) has a predominant role in improving PD motor symptoms, there are no evidence about specific effects in kinematic variables during TUG.

AIMS

Primary aims of our study were: a) to test in PD patients the reliability of the iTUG test in identifying kinematic parameters of dynamic disequilibrium, which can lead to higher fall risk; b) to evaluate the effect of dopaminergic therapy on these parameters.

PATIENTS AND METHODS

Study Population

Twenty-eight PD subjects were enrolled from patients attending the Movement Disorders Clinic in Catania. According to the inclusion criteria, our patients had a Hoehn & Yahr stage ≤ 3 , they did not have severe visual impairments or other ones that could interfere with gait, and they had to be able to walk independently and stand without support. The motor impairment was evaluated using the motor section of the Unified Parkinson's Disease Rating Scale (UPDRS-ME). Freezing of Gait Questionnaire (FOG-Q) and a specific fall risk questionnaire were administered to all patients.

Study Protocol

All participants performed consecutively TUG test three times and a 24 meters walking trial. Tasks were recorded in OFF and ON state using the portable sensor BTS G-WALK. Temporal-spatial parameters (phases duration, walking speed, acceleration, angular speed) and pelvic kinematic measures were derived from iTUG subtasks: sit-to-stand, mid-turning, turn-to-sit, stand-to-sit and from the walking phase.

CONCLUSIONS

Our results showed that several components of iTUG can reveal specific deficits of gait and turning in people with PD. Only certain aspects seem to be responsive to levodopa therapy. This knowledge could lead to pharmacological and rehabilitative individualized approaches for patients showing different kinematic features.

REFERENCES

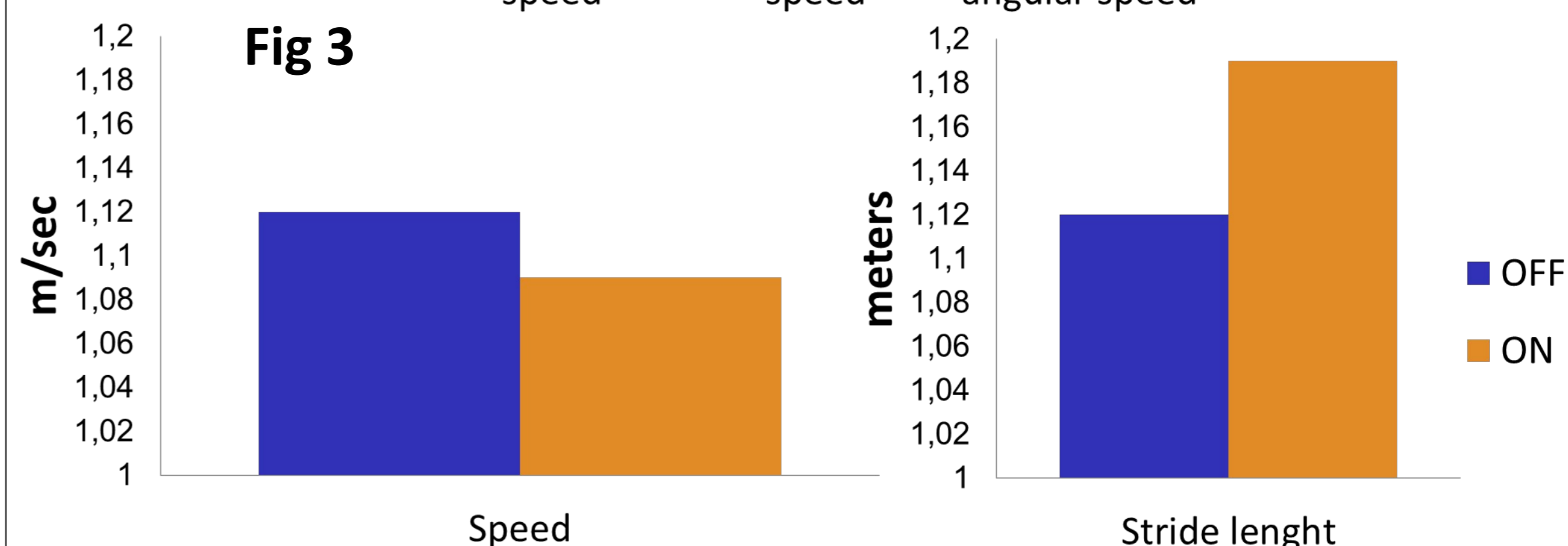
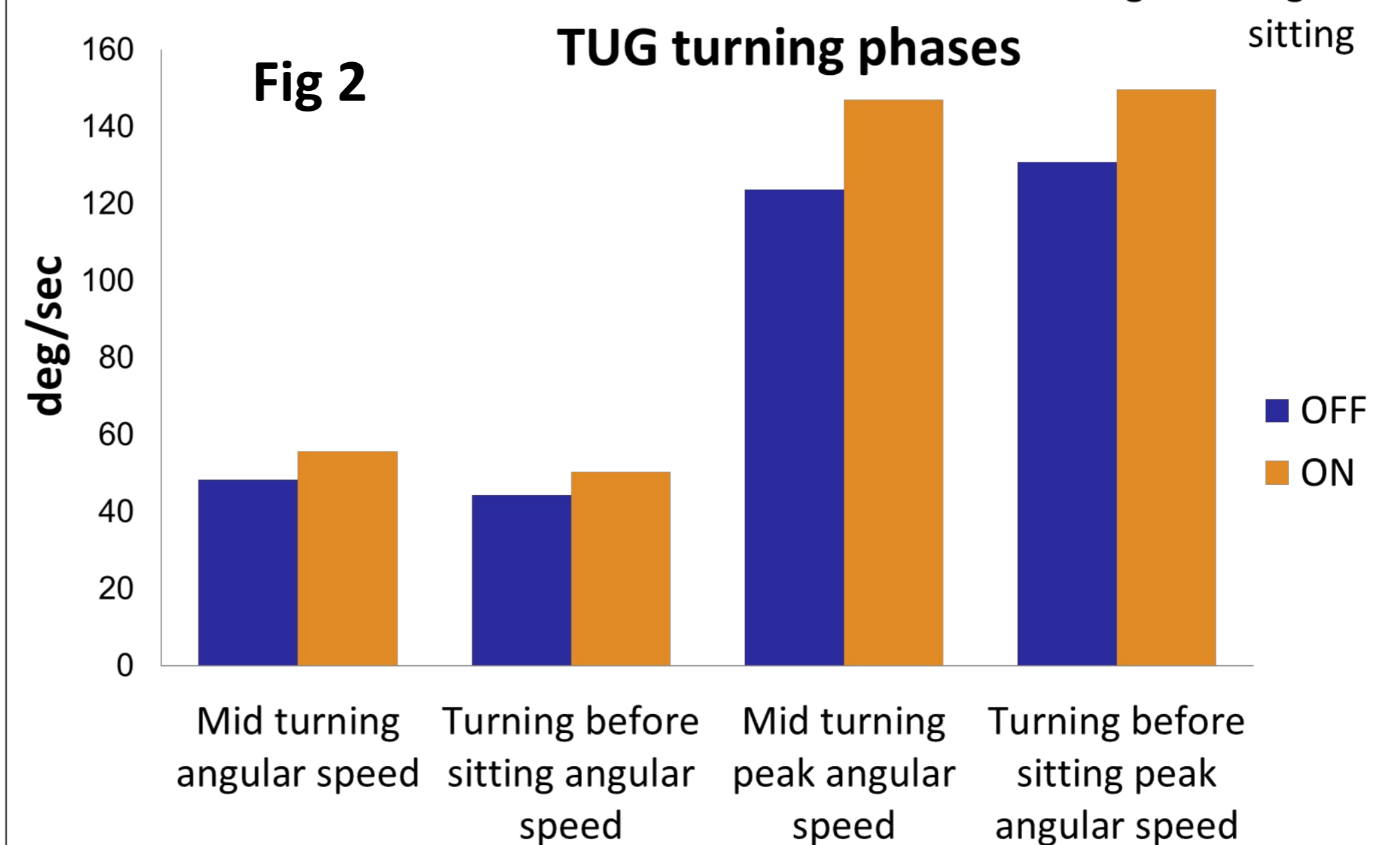
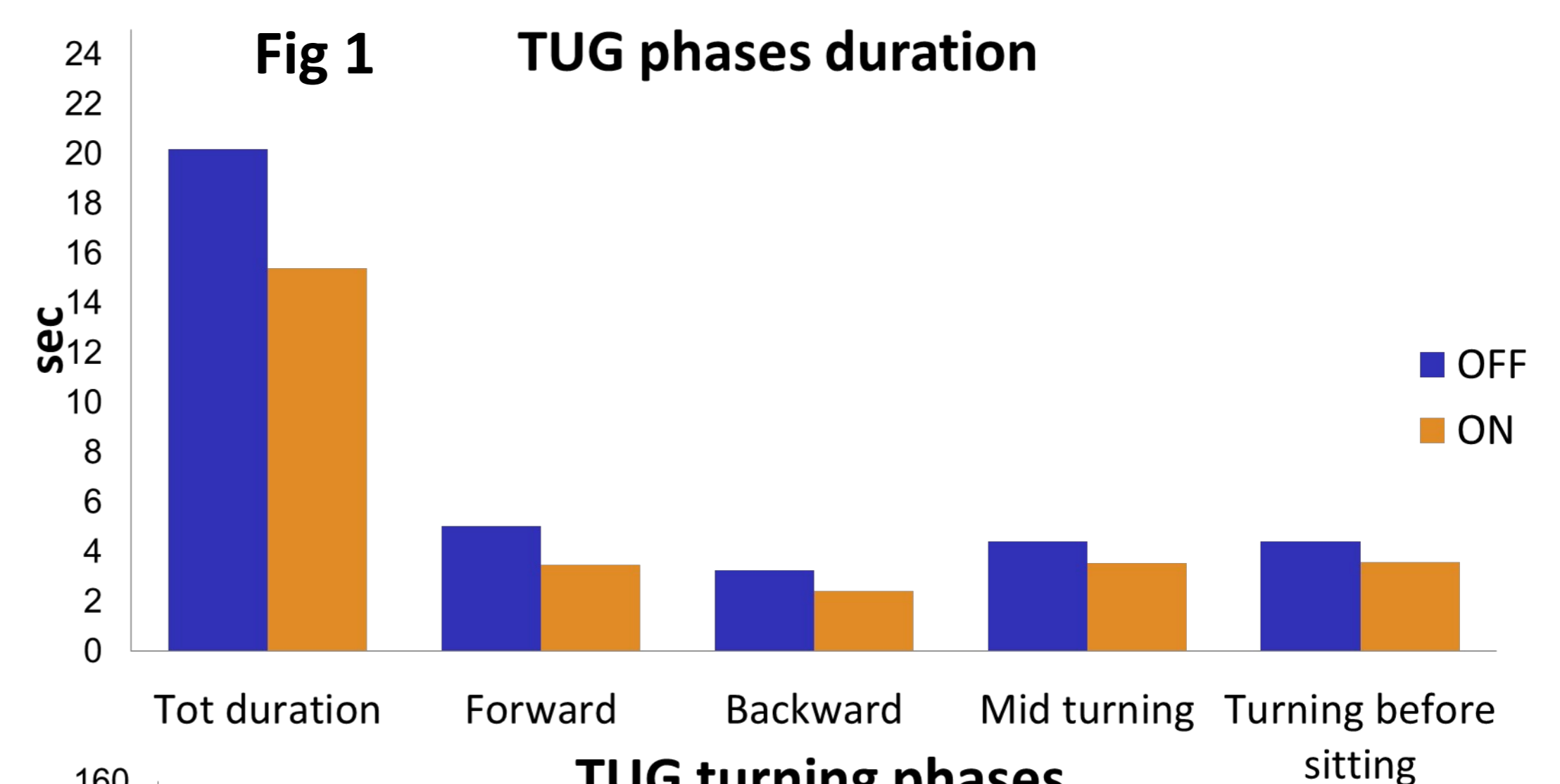
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RESULTS

Clinical characteristics of the participants are shown in table 1. Significant differences were detected between OFF and ON state in TUG total duration (20.18 ± 12.64 sec versus 15.4 ± 5.23 sec; $p=0.021$), forward phase duration (5.03 ± 4.55 sec versus 3.47 ± 1.83 sec; $p=0.037$), backward phase duration (3.23 ± 2.31 sec versus 2.43 ± 1.43 sec; $p=0.011$) (Figure 1). Significant decrement in duration as well as increment in angular speed and peak of angular speed was recorded during mid-turning and turning-before-sitting ($p<0.05$) (Figure 2). Speed and stride length significantly differed in OFF and ON state (respectively $p=0.05$; $p=0.004$) (Figure 3). Other parameters showed an improvement after LD intake, although not significant.

Table 1

| PD-patients (n=28) | |
|--------------------|-------------------|
| Age | 66.29 ± 8.48 |
| Age of onset | 58.50 ± 8.81 |
| Hoehn & Yahr stage | 2.23 ± 0.44 |
| UPDRS-ME OFF | 28.14 ± 10.02 |
| UPDRS-ME ON | 22.07 ± 10.14 |
| PIGD subscore OFF | 2.79 ± 1.71 |
| PIGD subscore ON | 2.07 ± 1.41 |
| AIMS | 3.50 ± 4.14 |
| FOG-Q | 9.28 ± 6.98 |



* Differences between OFF and ON are statistically significant