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Introduction

Gait impairment is a major symptom in Parkinson's disease (PD). It is associated with increased incidence of falls, loss of independence and reduced quality of life. Gait impairment is only partially improved by dopaminergic medications [1] and thus additional therapeutic strategies are required. Auditory cueing has demonstrated benefits for gait in PD [2]. A question remains however, as to when to introduce cues and if their effect changes with disease severity.

The aim of this longitudinal study was to assess the effect of auditory cueing on gait in a PD cohort of early disease and three years later.

Methods

Data were available for 11 participants with idiopathic PD (with repeat data at 18 and 54 months) from the ICICLE-Gait study. PD walked with and without an auditory cue (metronome beat set at individual cadence). Instructions were given to take a big step in time to the beat. Participants walked a distance of 8 meters over a GAITRite mat, repeated 4 times. A comprehensive battery of twelve gait characteristics were measured (step velocity, step length, swing time variability, step time, swing time, stance time, step velocity variability, step length variability, step time variability, stance time variability, step width and step width variability) [3]. Data analyses were performed using IBM SPSS version 21 with Wilcoxon test. A p value of 0.05 was deemed significant.

Results

Disease severity significantly increased over 3 years (UPDRS III – baseline: 28.09±9.70; after 3 years: 34.18±12.31, p=0.009). In early disease, characteristics of pace (step velocity – fig 1) and rhythm (mean step time, mean stance time – fig 2) improved with an auditory cue, but variability worsened (increased) (step time variability – fig 2). As disease progressed – after three years, similar improvements in characteristics of pace (step velocity, step length – fig 1) and rhythm (mean step time, mean stance time – fig 2) were observed. However, compared to baseline, no differences in variability were observed (fig 2).

Table 1. Clinical and demographic characteristics of participants – mean (SD).

Characteristics	18 months	54 months
Male/female (n)	m 6, f 5	m 6, f 5
Age (years)	64.77 (10.04)	67.45 (10.01)
UPDRS-III (score)	28.09 (9.70)	34.18 (12.31)
Hoehn and Yahr stage (range)	HY I, HY III	HY I, HY III
GDS (0-15)	2.36 (2.50)	2.27 (1.74)
MoCA (0-30)	28.45 (2.07)	27.54 (2.46)

Figure 1. Walking task with and without cue at baseline (18 months) and after 3 years (54 months) – step velocity and step length.

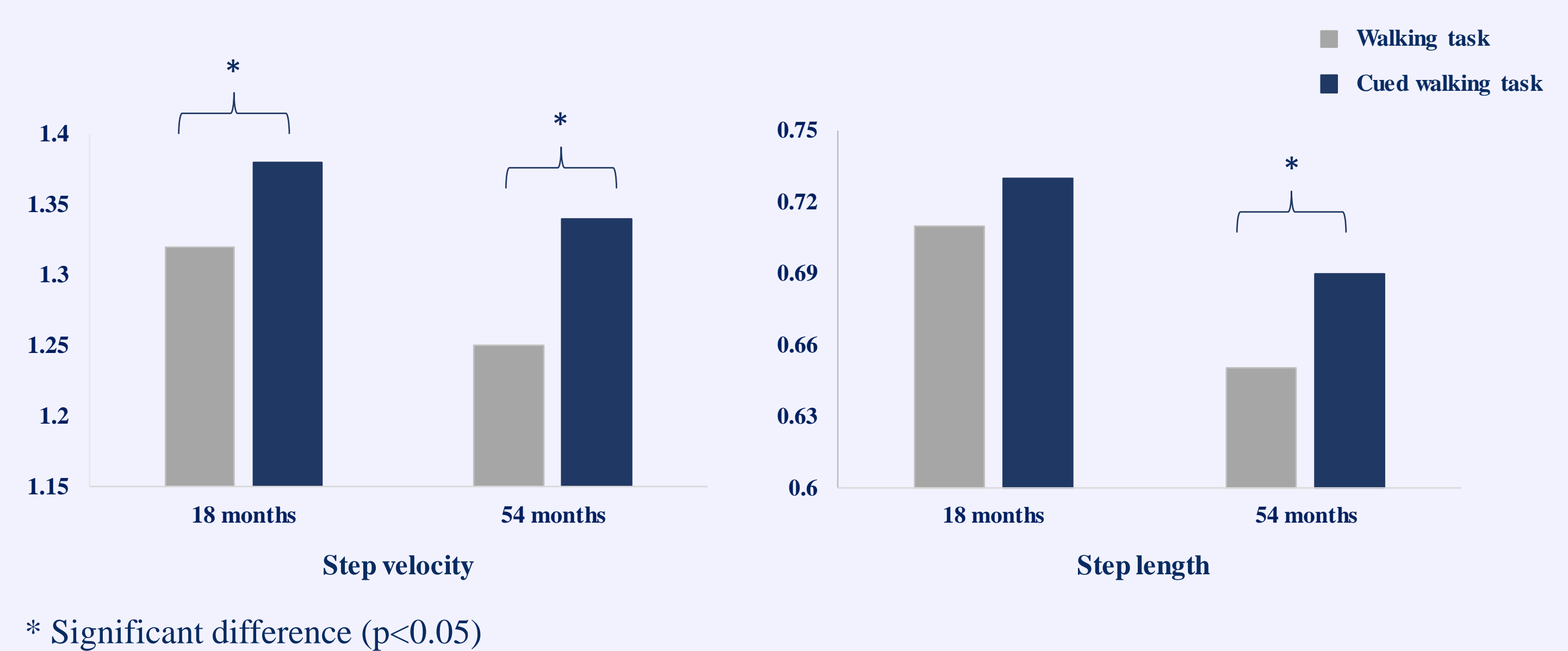
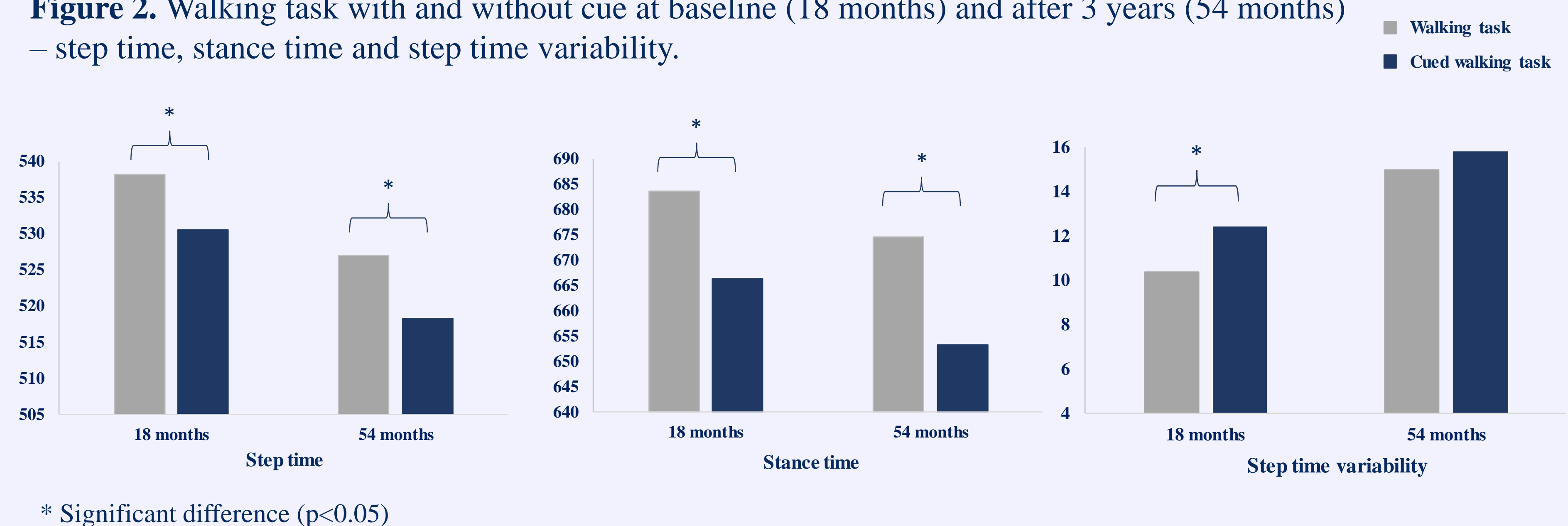


Figure 2. Walking task with and without cue at baseline (18 months) and after 3 years (54 months) – step time, stance time and step time variability.



Conclusions

- A rhythmic auditory cue improves discrete gait characteristics in early PD and as disease progresses.
- In early PD this may come at the cost of increased variability which is a risk factor for falls [4].
- The time when an auditory cue is introduced with respect to disease severity may therefore be a factor that should be taken into consideration.
- Studies with a larger cohort are needed to validate our results.

References

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