CENTER FOR RESEARCH IN HUMAN MOVEMENT VARIABILITY

Circadian rhythms and stride-to-stride fluctuations: is there a connection?

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INTRODUCTION

- Physiological systems exhibit rhythmic changes over the course of 24h[1] - **Circadian Rhythms.**
- Aging and neurological diseases have an increased likelihood of circadian disruption.
- Balance and gait exhibit diurnal variations[2,3].
- Gait is characterized by stride-to stride fluctuations[4].
- A breakdown in the temporal structure of these fluctuations has been associated with aging and neurological diseases[5].
- Circadian disruption may affect the stride-to-stride fluctuations over a 24h period.

The present study aims:

1) to investigate how stride-to-stride fluctuations vary throughout a day;
2) to examine the effects of chronotype in stride-to-stride fluctuations.

METHODS

Subjects:

- Three male participants (28.3±3.89yrs)

Data Collection:

- Chronotype (Morningness-Eveningness Questionnaire).
- 15min overground walking trials at 2h intervals (8am – 8pm), wearing insoles footswitches.

Data Analysis:

- Stride time was determined and we have calculated:
  - Mean.
  - Fractal scaling (i.e. temporal structure) was calculated through DFA[6].

RESULTS & DISCUSSION

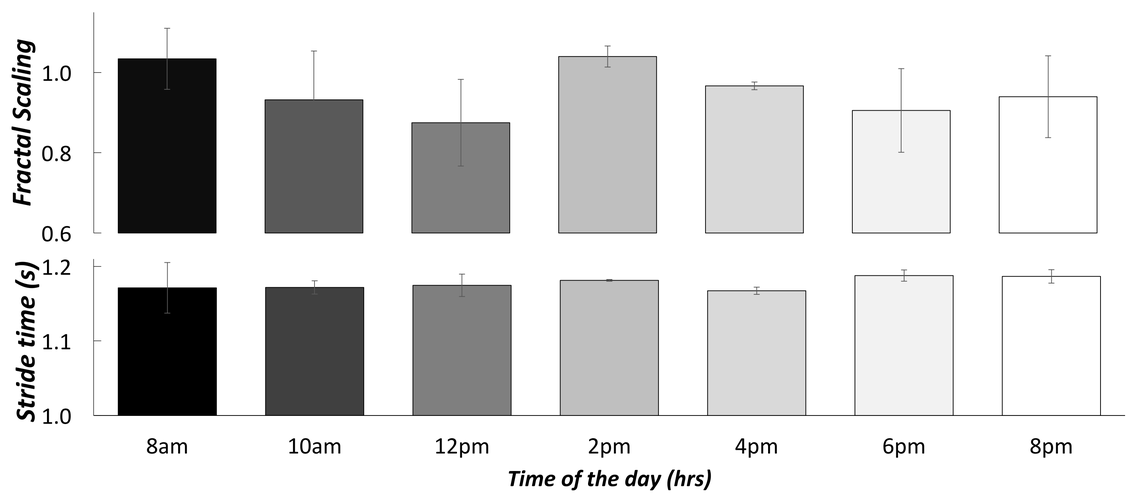

Figure 1. Mean group values of fractal scaling of inter-stride-intervals (upper panel) and stride time (lower panel) throughout the day.

- A certain cycle emerges for **daily fluctuations** of the fractal scaling of the **stride-to-stride fluctuations.** (Fig 1, upper panel)
- Consistency of the linear measures of stride time throughout the day (Fig 1, lower panel)

CIRCADIAN RHYTHM in gait control

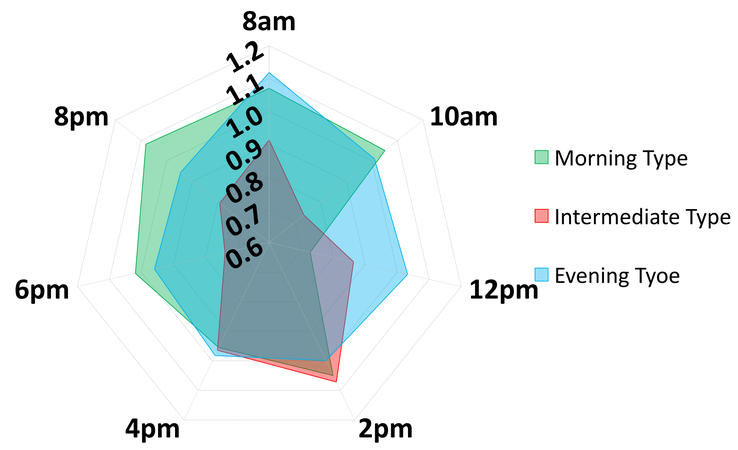

Figure 2. Individual daily pattern of α-value of stride time for three participants. Each chronotype seems to show a specific pattern of daily variations.

- Individuals with different chronotypes seem to present a specific pattern of gait variability

CONCLUSIONS

- Stride-to-stride fluctuations in gait are likely to be influenced by circadian rhythms.
- New insights of a potential increased risk of falling in older adults at specific times of the day that can be targeted of interventions.

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