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 - 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

• 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)

\[\text{CIRCADIAN RHYTHM in gait control}\]

CONCLUSIONS

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

• 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.

REFERENCES

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