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The relationship between sedentary bout duration and glucose in adults with Type 2 diabetes

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Abstract

Physical activity is important for blood glucose management in people with Type 2 diabetes (T2D). Little research has explored the relationship between sedentary behaviour and mean glucose and glucose variability in people with T2D using objective and continuous measurements.

Aims: To explore the relationship between sedentary bout duration and mean glucose and glucose variability in people with T2D using objective continuous measurement.

Methods: 16 participants with T2D managed with diet, Metformin or DPP4 inhibitors were recruited (mean age 64.1±10.9 yr & BMI 29.4±6.9 kg/m²). Participants completed a demographic questionnaire and wore an activPAL accelerometer and FreeStyle Libre continuous glucose monitor for 3-14 days whilst documenting sleep, food and medication. Average proportion of time spent sitting/lying, during the waking day were calculated. Bouts of wake time sedentary behaviour were identified and defined as a period of at least 30 minutes continuous, uninterrupted sitting/lying during the waking day. Correlation analysis was conducted to investigate the relationships between sedentary bout duration and mean glucose, glucose range and glucose coefficient of variation.

Results: On average, participants spent 65% of their day sitting/lying, 76% of sedentary bouts were ≥30minutes and 29% of bouts were ≥60minutes. Mean glucose was negatively ($r = -0.08$, $p < 0.01$) associated with sedentary bout duration. Glucose range ($r = 0.47$, $p < 0.001$) and glucose coefficient of variation ($r = 0.26$, $p < 0.001$) both positively correlated with sedentary bout duration. Participant characteristics such as age, gender and BMI appear to influence the relationship between sedentary bout duration and glucose response.

Conclusions: Results indicate increased sedentary time leads to improved mean glucose and increased glucose variability.

Introduction

- Physical activity is important for blood glucose management in people with Type 2 diabetes.
- Substantial benefits of leading an active lifestyle following diagnosis of Type 2 diabetes have been identified¹
- Regular breaks in sedentary behaviour have been associated with reduced variability in post-prandial glucose² and mean nocturnal glucose³
- High variability in blood glucose levels, in those with Type 2 diabetes, has been associated with developing long term micro and macrovascular complications, irrespective of HbA1c levels⁴
- Little research has explored the relationship between sedentary behaviour and mean glucose and glucose variability in people with Type 2 diabetes using objective and continuous measurements over an extended period of time.

Purpose

- To explore the relationship between sedentary bout duration and mean glucose and glucose variability in people with Type 2 diabetes using objective continuous measurement.

Methods

- 16 participants with Type 2 diabetes managed with diet, Metformin or DPP4 inhibitors were recruited (mean age 64.1±10.9 years & BMI 29.4±6.9 kg/m²)
- Participants completed a demographic questionnaire and wore an activPAL accelerometer and FreeStyle Libre continuous glucose monitor for 3-14 days whilst documenting sleep, food and medication
- Average proportion of time spent sitting/lying, standing and stepping, during the waking day were calculated
- Bouts of wake time sedentary behaviour were identified and defined as a period of at least 30 minutes or 60 minutes continuous, uninterrupted sitting/lying during the waking day
- Correlation analysis was conducted to investigate the relationships between sedentary bout duration and mean glucose, glucose range and glucose coefficient of variation

activPAL and FreeStyle Libre Devices



Results

- On average, participants spent 65% of their day sitting/lying, 26% standing and 9% stepping. This is illustrated in Figure 1
- 76% of sedentary bouts were ≥30minutes and 29% of bouts were ≥60minutes
- Mean glucose was negatively associated ($r = -0.08$, $p < 0.01$) with sedentary bout duration
- Figure 2 illustrates the positive association between sedentary bout duration and glucose range ($r = 0.47$, $p < 0.001$)
- Glucose coefficient of variation ($r = 0.26$, $p < 0.001$) positively correlated with sedentary bout duration

Figure 1: Proportion of time spent Sitting/Lying, Standing and Stepping

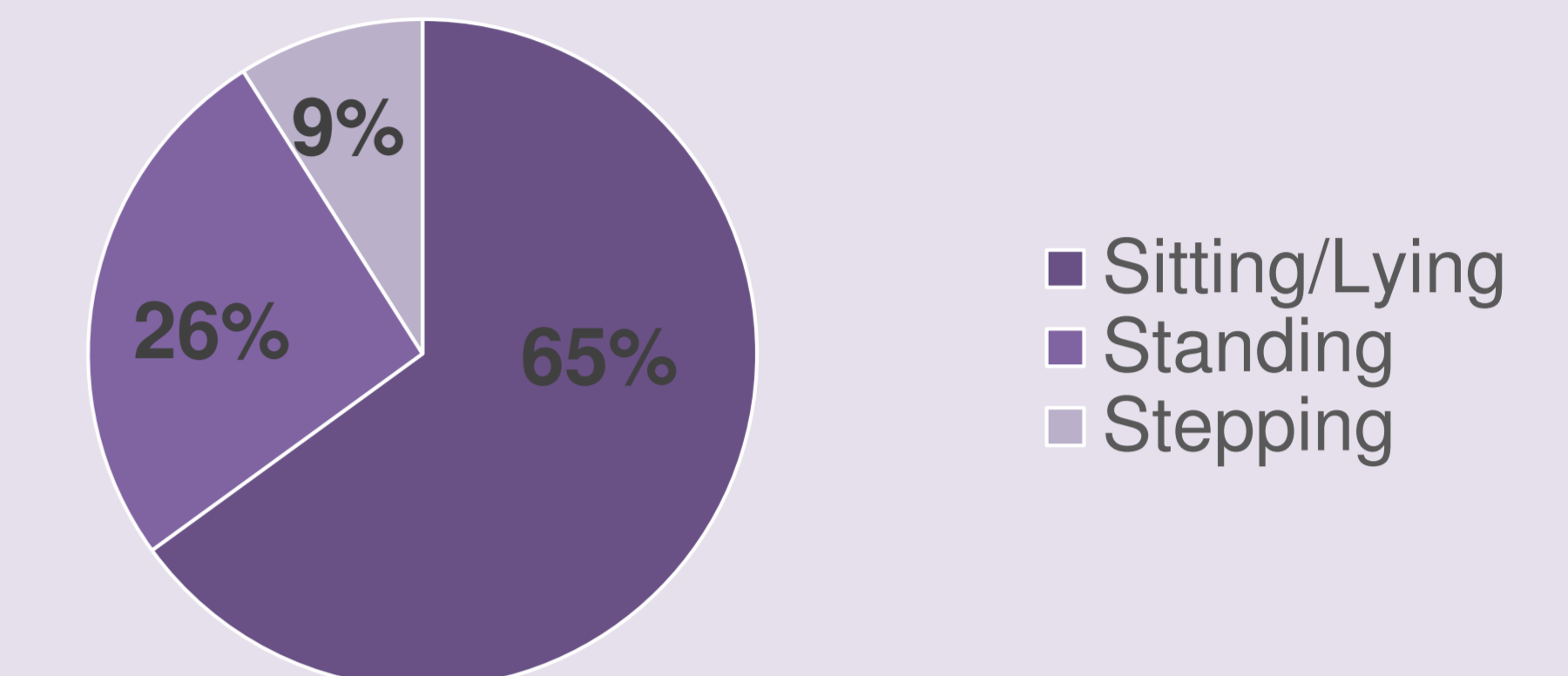
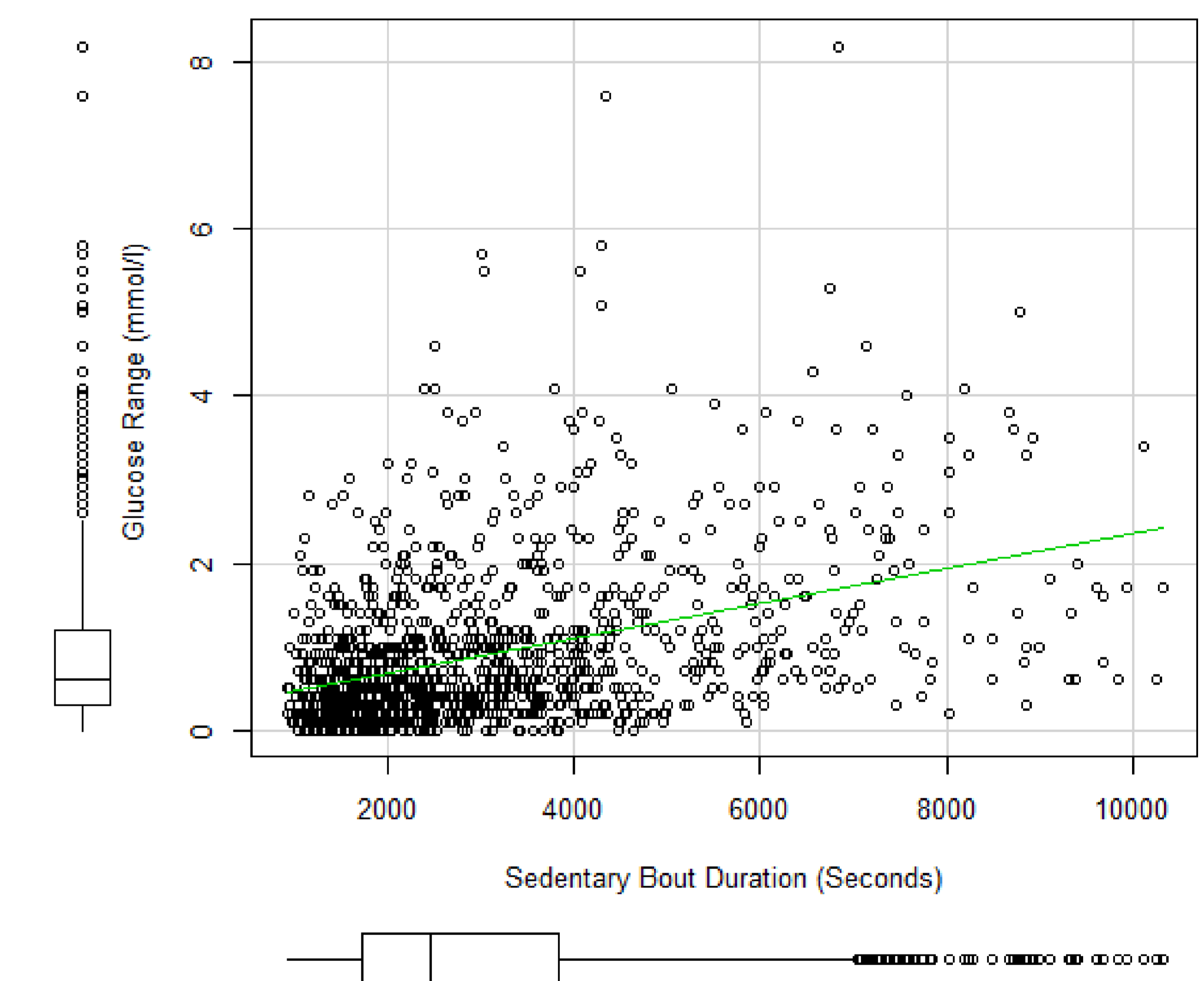


Figure 2: Sedentary Bout Duration and Glucose Range



Conclusions

Results indicate increased sedentary time leads to improved mean glucose and increased glucose variability

Recommendations

Future research should focus on examining the relationship between sedentary behaviour patterns and glucose in a larger sample size and examine the influence of characteristics such as age and BMI

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