

Sedentary Time and Sedentary Bout Duration and Waking Glucose in Adults with Type 2 diabetes

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Background

- People with Type 2 diabetes spend a significantly ($p < 0.01$) higher proportion of their waking day sedentary than those without diabetes [1].
- Leading an active lifestyle is a recognised and recommended method of improving glucose in those with Type 2 diabetes [2].
- Studies have examined the relationship between objectively measured physical activity and sedentary behaviour and continuously measured glucose in a lab setting^[3] but not in a freelifving setting.

Aims

To explore the relationship between physical activity and sedentary behaviour with wake time mean glucose and glucose variability in adults with Type 2 diabetes using objective continuous measurement in a free living setting.

Methods

- The study was of exploratory design using objective, continuous measurements in a freelifving setting.
- Sedentary behaviour and physical activity were measured using the activPAL accelerometer attached on the participants' right thigh.
- Glucose was measured through the interstitial fluid using the FreeStyle Libre flash continuous glucose monitor.



- The study was conducted over two visits.
- Participants were asked to go about their normal daily living for **3-14 days** whilst wearing the devices. Participants completed sleep, medication and food diaries.

Data Analysis

- Per day, the average proportion (% of time) of the waking day spent sitting/lying, standing and stepping were calculated using the summary output file from the activPAL.
- Number of sedentary bouts and sedentary bout duration were calculated using the events output file from the activPAL.
- To examine the relationship between overall proportion of physical activity and sedentary behaviour, by day (including sedentary bout duration), with mean daily glucose and glucose variability, correlation analysis was conducted.
- However, individual regression analysis was used to explore the **individual** nature of these relationships.

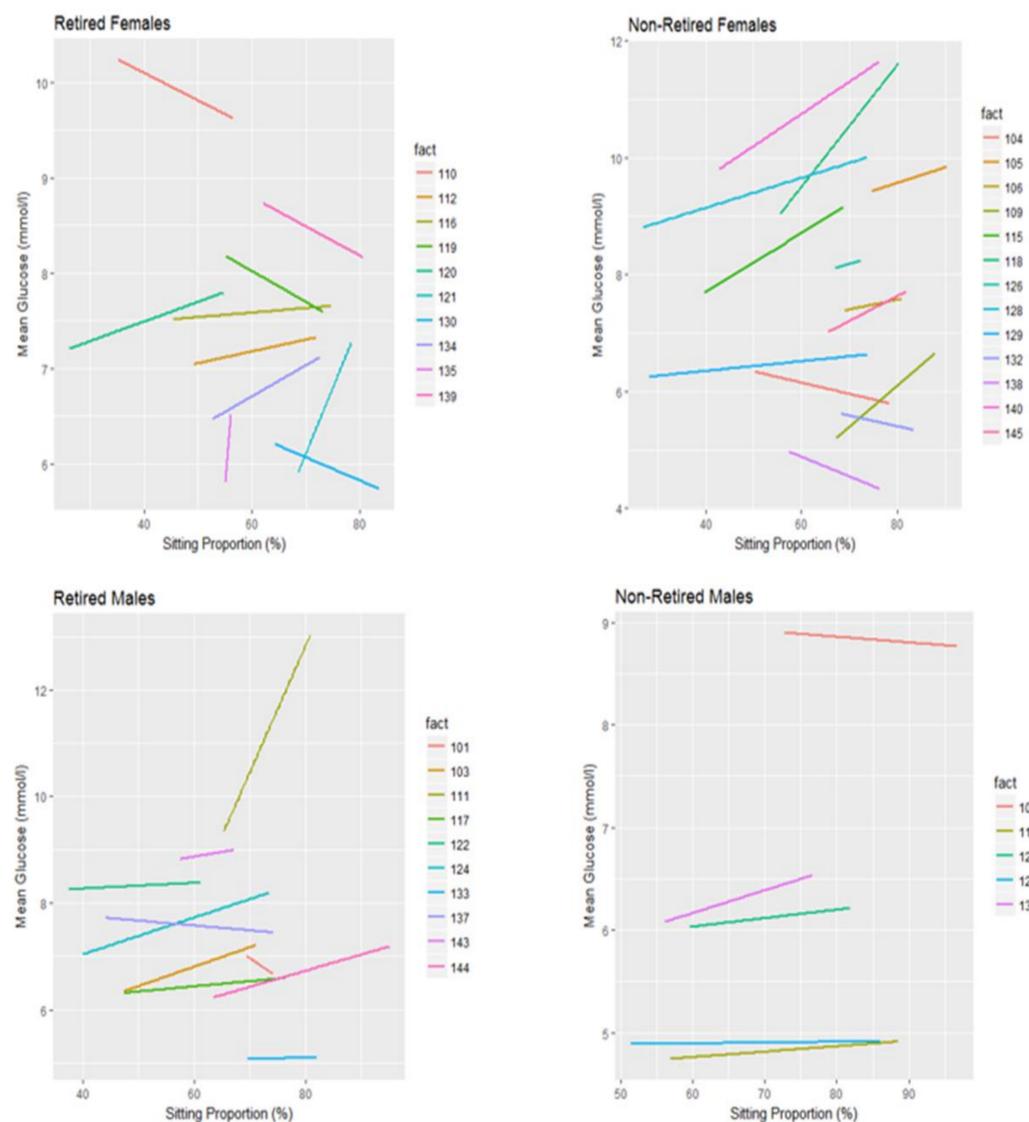
Results

- 38 participants with Type 2 diabetes (mean age 62.38 ± 10.38 yrs, mean BMI 29.85 ± 6.64 kg/m²) managed with diet and medication (not insulin) were recruited.
- On average, participants spent 64.32% of their day sedentary, 44.80% of sedentary bouts identified were 30-60 minutes in duration and 23.64% were >60 minutes long.

Results

- Mean glucose was negatively ($r = -0.15$, $p < 0.05$) associated with sedentary time but not sedentary bout duration.
- Glucose range ($r = 0.43$, $p < 0.05$) and glucose coefficient of variation ($r = 0.22$, $p < 0.05$) both positively correlated with sedentary bout duration.
- Sedentary time was negatively ($r = -0.24$, $p < 0.05$) associated with glucose CONGA.
- Individual regression analysis showed increased sitting time is associated with increased mean glucose in 28 of the participants, with a negative association being shown in 10 of the participants.

Figure 1. Illustration of individual relationship between daily sitting proportion and mean glucose in retired and non-retired males and females



Conclusions

- In analysis of the whole group, increased sedentary time is associated with decreased mean glucose and increased glucose variability.
- **However, individual regression analysis identified a different relationship pattern with the majority of participants ($n=28/38$)** showing increased sitting time to be associated with increased mean daily glucose.
- This finding highlights the importance of conducting individual analysis when exploring the relationship between behaviour and health outcomes using continuous objective methods of measurement.
- Future analysis should explore the impact of food intake and medication as confounding variables within this analysis.

References

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