Objective, continuous measurement of sedentary behaviour and glucose in people with Type 2 Diabetes

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Introduction

- Substantial benefits of leading an active lifestyle following diagnosis of Type 2 diabetes have been identified[1]
- Reducing sedentary time has been shown to be effective in the management of blood glucose levels irrespective of physical activity levels[2]
- Regular breaks in sedentary behaviour with light intensity walking are associated with reduced variability in glucose[3]
- Little research has examined daily levels of glucose and sedentary behaviour in those with Type 2 diabetes using objective and continuous measurements in a free living context

Aims

To explore levels of sedentary behaviour in those with Type 2 diabetes, and investigate the relationship between daily levels of sedentary behaviour and daily mean glucose in people with Type 2 diabetes using objective and continuous measurements

Methods

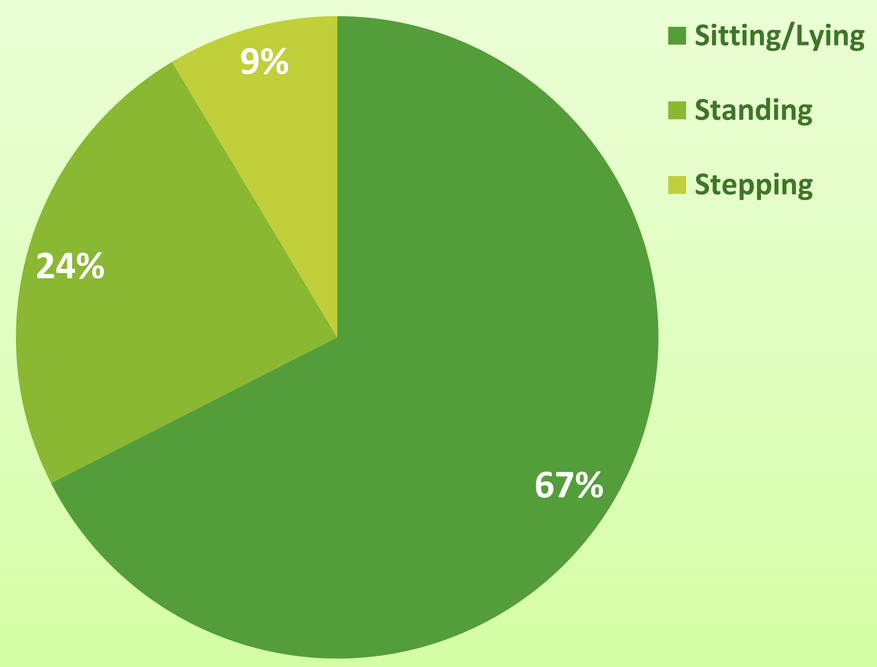
- Ten participants with Type 2 diabetes managed with diet, Metformin or DPP4 inhibitors were recruited
- Participants completed a demographic questionnaire and wore an activPAL accelerometer and a FreeStyle Libre continuous glucose monitor for 3-14 days
- Participants were also required to document their sleep, food and medication in diaries
- Average proportion of time spent sedentary and daily mean glucose during the waking day were calculated.
- A multiple linear regression was calculated to explore the relationship between sedentary time, age, BMI, and daily mean glucose

Example of activPAL and FreeStyle Libre Devices

Results

- 10 adults with a mean age of 63.5±9.4 years participated
- Mean BMI was calculated as 30.8±6.9 kg/cm^2
- Participants spent 67.5% of their waking day sitting/ lying (Figure 1)
- Daily mean glucose was calculated as 7.7±1.8mmol/l
- Regression analysis suggested a significant effect ($F(3,105) = 16.52$, $p < 0.01$) for sitting/lying time, age and BMI on daily mean glucose ($R^2 = 0.30$)
- Daily mean glucose increased significantly ($p < 0.01$) with increased sedentary time, BMI and age. With daily mean glucose increasing by 5.14mmol/l for each percent of daily sitting/lying, 0.16mmol/l for each increasing year of age and 0.21mmol/l for each increasing BMI unit

Proportion of time spent sitting/ lying, standing and stepping



Discussion and Conclusions

- Average sitting/lying time was higher than has previously been reported
- Percentage sitting/lying time, age and BMI were identified as significant predictors of higher daily mean glucose in people with Type 2 diabetes
- Results suggest that increased sedentariness is associated with increased daily mean glucose in those with Type 2 diabetes

Recommendations

- Future analysis should focus on examining the relationship between daily sedentary behaviour and glucose in a larger sample size
- Patterns in sedentary behaviour and resultant patterns in glucose should also be examined

References

[1]Umpierre et al. (2011). Physical activity advice only or structured exercise training and association with HbA1c levels in type 2 diabetes: a systematic review and meta-analysis. *Jama.* 305.17,1790-1799.

[2]Dunstan et al. (2012). Breaking up prolonged sitting reduces postprandial glucose and insulin responses. *Diabetes care.* 35.5, 976-983.

[3]Dempsey et al. (2016). Benefits for type 2 diabetes of interrupting prolonged sitting with brief bouts of light walking or simple resistance activities. *Diabetes Care. 39*(6), 964-972.

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