The impact of sedentary time and breaks in sedentary time on 24 hour hypoglycaemia, euglycaemia and hyperglycaemia in type 2 diabetes.

AC Paing[1], KA McMillan[2], A Kirk[2], A Collier[1], A Hewitt[2] and SFM Chastin[1,3].

[1] School of Health and Life Sciences, Glasgow Caledonian University, Glasgow, UK, [2] Physical Activity for Health Group, School of Psychological Sciences and Health, University of Strathclyde, Glasgow, UK, [3]Department of Movement and Sports Science, Ghent University, Ghent, Belgium.

ayechan.paing@gcu.ac.uk

Introduction

- The detrimental association of sedentary time with 2-h postprandial glucose and time in hyperglycaemia was previously reported.
- However, research undertaken within a habitual living setting investigating the impact of sedentary time and breaks in sedentary time on 24 hour hypoglycaemia, euglycaemia and hyperglycaemia in Type 2 diabetes is not available.

Aims

- To investigate the associations of objectively measured sedentary time and breaks in sedentary time with 24 h our events and duration of hypoglycaemia, euglycaemia and hyperglycaemia in Type 2 diabetes.

Methods

- A total of 37 participants with Type 2 diabetes managed by diet modifications or metformin ± sulfonylurea ± gliptin (mean age 62.8±10.5 years) participated.
- Participants wore the activPAL3 and CGM (Abbot FreeStyle Libre) for up to 14 days.
- Average total sedentary time and number of breaks in sedentary time per day were calculated.
- Events and time in euglycaemia (3.9-7.8mmol/l), hyperglycaemia (>7.8mmol/l), above target (>9mmol/l) and hypoglycaemia (<3.9mmol/l) per day were computed.
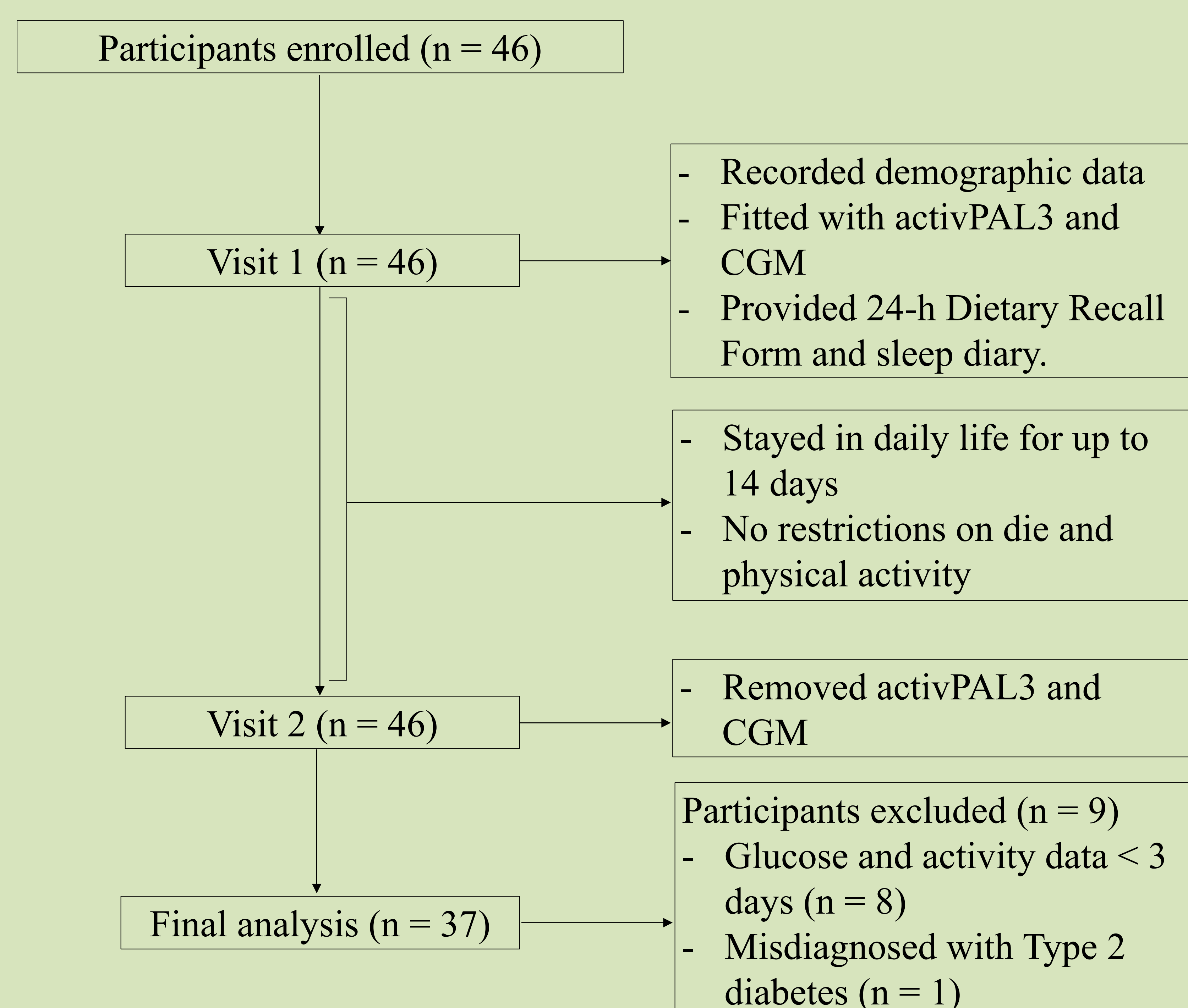- Linear regression analyses and normalisation method for missing glucose values were used.

Participants enrolled (n = 46)

Visit 1 (n = 46)
- Recorded demographic data
- Fitted with activPAL3 and CGM
- Provided 24-h Dietary Recall Form and sleep diary.

- Stayed in daily life for up to 14 days
- No restrictions on die and physical activity

Visit 2 (n = 46)
- Removed activPAL3 and CGM

Final analysis (n = 37)

Participants excluded (n = 9)
- Glucose and activity data < 3 days (n = 8)
- Misdiagnosed with Type 2 diabetes (n = 1)

Figure 1. Study protocol.

Results

Table 1. Standardised regression of total sedentary time with glycaemic control measures

Glycaemic control measures	β (95% CI)	p value	Adjusted R^2
Time in euglycaemia (% of recording h/day)	-0.44 (-0.1, -0.00)	0.04	0.14
Time in hyperglycaemia (% of recording h/day)	0.36 (-0.01, 0.1)	0.08	0.14
Time above target (% of recording h/day)	0.33 (-0.01, 0.1)	0.11	0.15
Time in hypoglycaemia (% of recording h/day)	0.09 (-0.01, 0.02)	0.68	0.03
Euglycaemic events (n/day)	-0.07 (-0.3, 0.2)	0.72	0.05
Hyperglycaemic events (n/day)	0.08 (-0.3, 0.4)	0.72	0.05
Events above target (n/day)	0.29 (-0.1, 0.5)	0.17	0.12
Hypoglycaemic events (n/day)	-0.05 (-0.3, 0.2)	0.81	-0.05
HbA_{1c} (mmol/mol)	0.87 (-0.3, 12.0)	0.06	-0.003
HbA_{1c} (%)	0.89 (-0.02, 1.1)	0.056	-0.02

Adjusted for age, sex, BMI, carbohydrate intake, energy expenditure and medication.

Table 2. Standardised regression of breaks in sedentary time with glycaemic control measures

Glycaemic control measures	β (95% CI)	p value	Adjusted R^2
Time in euglycaemia (% of recording h/day)	0.38 (0.00, 0.01)	0.04	0.07
Time in hyperglycaemia (% of recording h/day)	-0.30 (-0.01, 0.001)	0.11	-0.001
Time above target (% of recording h/day)	-0.30 (-0.01, 0.001)	0.11	-0.03
Time in hypoglycaemia (% of recording h/day)	-0.15 (-0.003, 0.001)	0.39	0.02
Euglycaemic events (n/day)	-0.12 (-0.04, 0.02)	0.52	-0.09
Hyperglycaemic events (n/day)	-0.15 (-0.05, 0.02)	0.39	0.07
Events above target (n/day)	-0.25 (-0.06, 0.01)	0.16	0.09
Hypoglycaemic events (n/day)	-0.16 (-0.04, 0.02)	0.39	-0.06
HbA_{1c} (mmol/mol)	-0.42 (-0.7, 0.09)	0.13	0.18
HbA_{1c} (%)	-0.38 (-0.06, 0.01)	0.17	0.16

Adjusted for age, sex, energy expenditure, medication and total sedentary time.

Conclusions

- Greater total sedentary time was associated with less time in euglycaemia.
- More breaks in sedentary time were associated with greater time spent in euglycaemia.
- A trend towards the detrimental association of total sedentary time with time in hyperglycaemia and HbA1c was observed.
- A reduction of total sedentary time and frequent break in sedentary time should be recommended for better glycaemic control in people with Type 2 diabetes.

Acknowledgement

References

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