Association of changes in glycaemic variability with the structured self-monitoring of blood glucose and diabetes medication prescription

DM Williams[1,2], S Parsons[1], A Holborow, G Dunseath[1], DR Owens[1], S Luzio[1], JW Stephens[1,2]

[1]Diabetes Research Group, Swansea University, Swansea, UK

[2]Department of Diabetes & Endocrinology, Morriston Hospital, Swansea, UK

Introduction

Structured self-monitoring of blood glucose (SMBG) improves glycaemic control in patients with non-insulin treated type 2 diabetes (T2D)[1].

Aim

To determine changes in simple indices of glycaemic variability (GV) when utilising structured SMBG to improve glycaemic control in persons with T2D.

Examine changes in GV associated with the number of additional orally administered glucose lowering medication during the study.

Methods

People with non-insulin treated T2D undertook structured SMBG over 12 months, with SMBG measurements and the number of medication prescription/s recorded at the start and at 12 months[2].

Measures of glycaemic control (HbA1c, mean blood glucose (M-BG) and fasting blood glucose (FBG) were determined for each participant during the first and final 3 months of the study. GV (standard deviation of blood glucose (SD-BG), coefficient of variation of blood glucose (CV-BG) and mean absolute glucose change (MAG) were also derived for these periods of time. Differences in these measurements were compared based on the number of additional diabetes medication prescribed over the course of the study.

Results

One-hundred and eighty-five T2D participants with a median age 64.3 years (58.2% male) were included for analysis.

The median HbA1c was 68.0 mmol/mol (8.4%) at baseline compared with 55.0 mmol/mol (7.2%) at 12 months ($p<0.001$). Participants were prescribed a mean 1.67 diabetes medications at the start of the study and 2.22 diabetes medications at the end of the study ($p<0.001$).

Participants with no medication changes demonstrated improvements in each of the observed measures of glycaemic control and GV. Participants with an increasing number of new diabetes medication prescribed during the study demonstrated greater improvements in M-BG, FBG, and HbA1c, but not GV (SD-BG) or MAG. Those participants with the highest number of new diabetes medication had a significantly greater GV (CV-BG) at completion of the study.

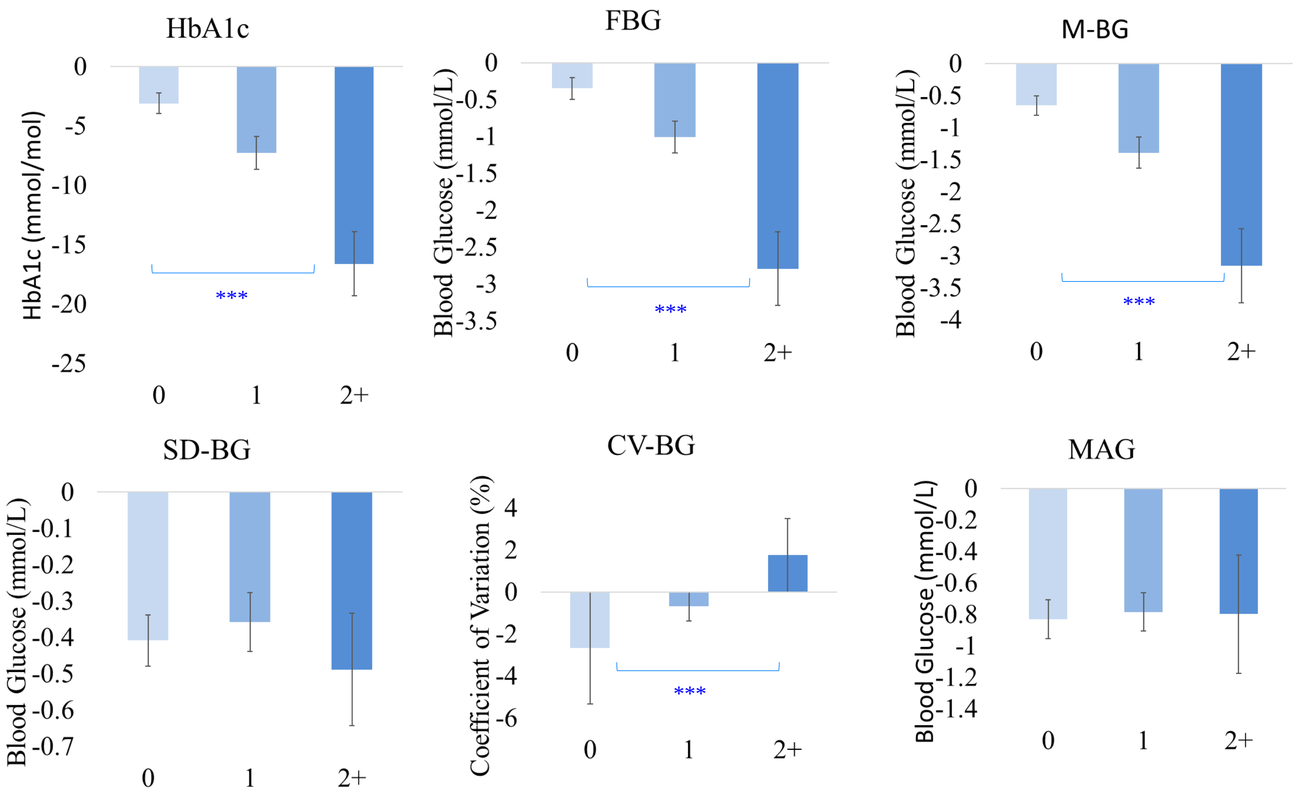
Results continued

Table 1: Changes in metabolic parameters including GV and number of additional diabetes medication prescriptions

	0 New Medication (n = 95)	1 New Medication (n = 75)	2+ New Medication (n = 15)
HbA_{1c} (mmol/mol)	-4.0 [-8.0–2.5]	-8.0 [-12.5–-2.0]	-18.0*** [-25.0–-9.0]
FBG (mmol/L)	-0.5 [-1.1–0.5]	-0.8 [-2.2–-0.1]	-2.4*** [-4.1–-1.9]
Mean BG (mmol/L)	-0.8 [-1.4–0.1]	-1.4 [-2.5–-0.6]	-3.8*** [-4.8–-1.4]
SD-BG (mmol/L)	-0.4 [-0.4–0.0]	-0.43 [-0.70–-0.15]	-0.5 [-1.0–0.0]
CV-BG (%)	-2.4 [-5.8–1.4]	-0.94 [-4.44–2.92]	+1.5*** [0.0–3.4]
MAG (mmol/L)	-0.9 [-1.5–-0.2]	-0.67 [-1.42–-0.23]	-0.94 [-1.58–0.52]

Median [IQR]. Significance between groups determined by one-way ANOVA. ***P <0.001.

Figure 1: Changes in metabolic parameters including GV according to number of additional diabetes medication prescriptions



Data presented as the mean, error bars represent the standard error of the mean..
Significance of trend between groups determined by one-way ANOVA. ***P <0.001.

Conclusion

Structured SMBG was associated with a significant improvement in glycaemic control over 12 months. There was a statistically significant increase in the number of diabetes medication prescribed over the study. With an increasing number of new diabetes medication prescription, there were significantly greater improvements in the HbA1c, M-BG and FBG. However, there was no significant change in the SD-BG or MAG associated with introduction of increasing number of additional diabetes medications although those with more medication had significantly higher CV-BG at the end of the study.

References

1. Parsons et al. Diabetic Medicine. 2019. doi: 10.1111/dme.13899

2. Parsons *et al.* BMC Endocrine Disorders 2017;17:4