Factors Associated with Hyperglycemic Excursions among Young Adults with Type 1 Diabetes

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Introduction

- Glycemic Variability (GV) has been implicated in the development of diabetes-related complications.
- Research is limited as to how GV differs by personal, demographic and lifestyle habits in people with Type 1 diabetes (T1DM).

Purpose

- To explore differences in GV among young adults with T1DM by age of onset (childhood [< 12 years]; or teenager/adults [≥12 years]); and HbA1c.
- To compare difference in GV on weekdays (WD) an d weekends (WE).

Methods

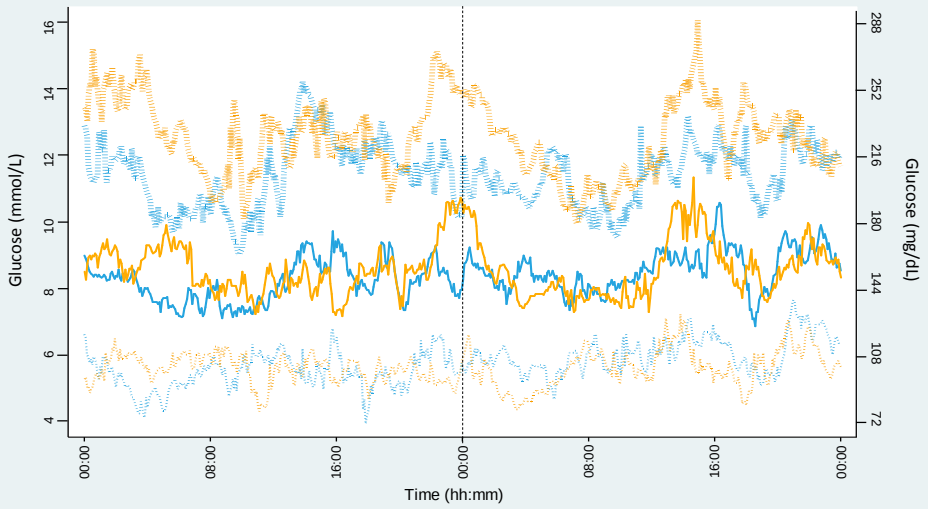
- Sixty subjects wore continuous glucose monitors for up to 6 days including WD/WE.
- GV measures were calculated using the Easy GV version 9.0 software for the following: mean, SD, continuous overlapping net glycemic action (CONGA), lability index (LI); J-index; low blood glucose index (LBGI), high blood glucose index (HBGI), glycemic risk assessment in diabetes equation (GRADE), mean of daily differences (MODD), mean amplitude of glucose excursions (MAGE), average daily risk ratio (ADRR), M-value, and mean absolute glucose (MAG).
- T-tests were conducted to examine differences among variables using STATA version 14.0.

Conclusion

- Participants with childhood onset of T1DM and HbA1c ≥ 8% were at greater risk for hyperglycemic excursions. All subjects had greater risk for theses excursions on WE compared to WD. This suggests that along with optimizing glucose control, people with T1DM need to be cognizant as to how weekend activities place them at greater risk for hyperglycemic excursions.

Results

Figure 1. Sensor Glucose Levels measured by CGM



Data are shown as median and interquartile range,
with free-living values during the 48-hours of WD in Blue and of WE in Orange

Table 1. Results of Glycemic Variability among Variables (N=60)

GV	WD (n=60)	WE (n=60)	t	CO (n=32)	T/AO (n=28)	t	HbA1c ≥ 8% (n=22)	HbA1c <8% (n=38)	t
Mean	9.16	9.83	**2.70****	9.91	9.02	1.68	10.94	8.66	**4.80*****
SD	3.16	3.53	**2.80****	3.80	3.18	**2.61***	4.13	3.15	**4.28*****
CONGA	8.11	8.84	**3.00****	8.93	8.07	1.71	9.91	7.73	**4.87*****
LI	5.83	6.25	.91	6.95	5.32	**2.19***	7.72	5.31	**3.28****
J-index	51.37	61.50	**3.71*****	63.40	50.67	**2.07***	75.22	47.17	**5.14*****
LBGI	4.06	3.82	-.49	4.54	3.81	1.02	3.97	4.33	-.49
HBGI	10.32	13.28	**3.92*****	13.55	10.03	**2.28***	16.38	9.32	**5.09*****
GRADE	7.82	9.70	**2.89****	9.66	7.56	1.80	11.72	6.92	**4.49*****
GRADE_%Hypo	3.58	3.22	.15	3.79	3.06	.47	2.34	4.38	-1.33
GRADE_%Eugly	5.75	4.73	-1.12	4.65	5.61	-1.09	3.58	6.17	**-3.25****
GRADE_%Hyper	90.67	92.05	.31	91.56	91.33	.12	94.08	89.45	**2.67***
MODD	3.72	4.46	1.78	4.89	3.32	**3.63****	4.56	3.55	**2.85****
MAGE	7.73	8.45	1.86	8.72	7.69	1.67	9.86	7.36	**4.41*****
ADDR	33.08	36.95	**2.52***	39.16	29.08	**2.32***	44.10	28.43	**3.97*****
M-Value	13.87	19.98	**3.96*****	19.93	13.46	**2.32***	24.57	12.47	**4.72*****
MAG	2.68	2.68	.01	2.85	2.52	**2.13***	2.81	2.63	1.06

***$p < .001$, **$p < .01$, *$p < .05$

- There were 60 subjects with T1DM: female (61.7%); age (25.7 ± 5.2 years); Caucasian (88.3%); with onset of T1DM: childhood (53.3%); duration of T1DM (12.8 ± 8.5 years); HbA1c (7.6 ± 1.1 %); and BMI (26.5 ± 4.1 kg/m^2).
- There were significant differences in the HBGI between WD and WE (10.32 ± 5.47. vs. 13.28 ± 7.92; $t = 3.92$, $p < 0.001$); childhood and teenager/adults onset of T1DM (13.55 ± 6.38 vs. 10.02 ± 5.46; $t = 2.28$, $p = 0.026$); and HbA1c ≥ 8% or < 8% (16.38 ± 5.92 vs. 9.32 ± 4.71; $t = 5.09$, $p < 0.001$).

Implication

- Knowledge of the hyperglycemic excursions in people with T1DM may prove to be important for clinicians involved in the treatment and care of people with T1DM.

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