RELATIONSHIP BETWEEN A1c LEVELS, SMBG FREQUENCY AND GLYCEMIC VARIABILITY IN TYPE 1 DIABETIC SUBJECTS CSII USERS COMPARED WITH TYPE 1 AND TYPE 2 MDI THERAPY

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Background:

The A1C assay, measures chronic glycemia and is widely used to judge the adequacy of diabetes treatment.
Self-monitoring of blood glucose provides information about blood glucose control. Analyzing blood glucose data in a systematic method on a computer may reveal patterns that are not obvious from a logbook.

Aims

To assess the relationship between HbA1c, frequency of SMBG and glycemic variability in a group of type 1 diabetes CSII users, compared with type 1 and type 2 (on secondary failure to OHA) MDI therapy subjects.

Method

A1C levels of 50 type 1 diabetes CSII users (M/F 18/32), 30 MDI type 1 subjects (M/F 17/13), and 30 MDI type 2 subjects on secondary failure to OHA, whose characteristics are shown in tab.1, were correlated with average glucose, frequency of SMBG, glycemic standard deviation, and average amount of total daily insulin. All of the data both glucometer and pump, were downloaded by diabetes management systems. All data were filtered by date and last 3 months, was the time period set.

Tab. 1

	CSII (AVG±STD)	MDI T1DM (AVG±STD)	MDI T2DM	p
Subjects (M/F)	50 (18/32)	30 (17/13)	30 (16/14)	---
AGE (ys)	30,7±14,55	23,3±14,2	71.5±8,28	0.029
A1c	7.62±0.82	7.83±1.02	7,86±0,92	0.315
Frequency of SMBG	4,39±1,79	2,59±1,38	1,25±1,08	0.000
Glycemic Standard dev.	76.95±16,98	86.7±17,8	57.5±20,1	0.000
Average Insulin	44,53±21,12	47,33±16,48	44,2±15,3	0.536

Sources

A. Pfutzner Glycemic Variability Is Associated with Frequency of Blood Glucose Testing and Bolus: Post Hoc Analysis Results from the ProAct Study. Diab Technol & Therap. 17, 6: 392-397, 2015

K. M. Miller, et al. for the T1D Exchange Clinic Network: Evidence of a Strong Association Between Frequency of Self-Monitoring of Blood Glucose and Hemoglobin A1c Levels in T1D Exchange Clinic Registry Participants. Diabetes Care 36:2009–2014, 2013

B. P. Kovatchev, et al.: Accuracy and Robustness of Dynamical Tracking of Average Glycemia (A1c) to Provide Real-Time Estimation of Hemoglobin A1c Using Routine Self-Monitored Blood Glucose Data. Diab Technol & Therap: 16, 5: 303-309, 2014

Results

The results are shown in tab. 2 for CSII, tab. 3 and tab. 4 for MDI subjects, respectively.

Tab. 2: CSII group

Correlation	r	p
between A1C and:		
Average Glucose (AG)	0.674	0.000
Frequency of SMBG	-0.455	0.000
Standard deviation	0.516	0.000
Average amount of total daily insulin	-0.077	0.596

Tab. 3: T1DM MDI group

Correlation	r	p
between A1C and:		
Average Glucose (AG)	0.538	0.002
Frequency of SMBG	-0.165	0.382
Standard deviation	0.325	0.079
Average amount of total daily insulin	0.111	0.559

Tab. 4: T2DM MDI group

Correlation	r	p
between A1C and:		
Average Glucose (AG)	0.063	0.742
Frequency of SMBG	0.012	0.950
Standard deviation	0.005	0.981
Average amount of total daily insulin	0.137	0.471

Conclusion

This study confirms the relationship between A1C and SMBG frequency, and between A1C and a glycemic variability index, in a group of selected CSII users. The practice of SMBG and its use for insulin adjustment, requires continuing education, in order to translate SMBG in real diabetes self-management. The importance of controlled glycemic control in the appropriate management of diabetes legitimizes the growing development of continuous monitoring systems.

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