Does Continuous Glucose Monitoring detect Diabetic range Hyperglycaemia in Prediabetes?

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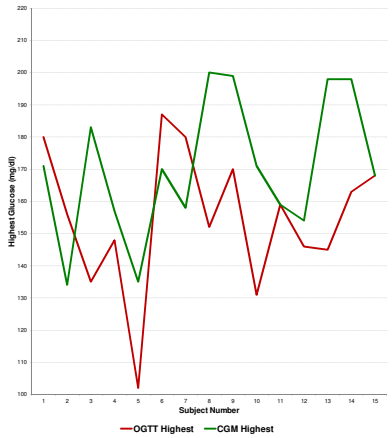
INTRODUCTION: In day to day life meal compositions differ and the amount of carbohydrate intake may be larger as compared to the amount used for oral glucose tolerance test (OGTT). This could lead into higher peaks in blood glucose levels. Continuous glucose monitoring (CGM) may unravel these glucose excursions not detected by OGTT. CGM can also be used for assessment of glycaemic variability. This may be important in prediabetes which is characterized by subnormal glucose auto-regulation, diverse pathophysiology and unpredictable natural history. The objective of this study was to see whether CGM can detect diabetic range glucose excursions and also to assess glycaemic variability in subjects with prediabetes.

MATERIALS AND METHODS: After an informed consent, eligible subjects with prediabetes based on OGTT were connected to a CGM device (iPro2 Medtronic) for 72 hours. The report generated by iPro CareLink software was used to calculate glycaemic parameters. Glycaemic variability [Standard Deviation (SD) and Mean Amplitude of Glycaemic Excursions (MAGE)] were assessed using Easy GV© software. The estimated average glucose (eAG) corresponding to HbA1C values were calculated using a software available at http://professional.diabetes.org/ eAG. (IRB Min no. 7495 dated 07.06.2011).

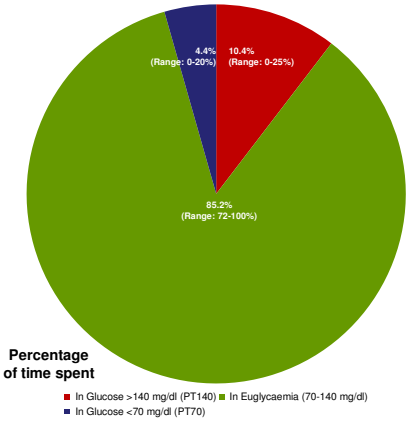
RESULTS: The study comprised of 15 subjects, all were women, mean age was 36.13 years (SD 9.1) and mean BMI was 31.5 kg/m^2 (SD 7.9). Three subjects had IFG*, 2 had IGT** and 10 had both IFG and IGT.

OGTT vs. CGM
Highest glucose values



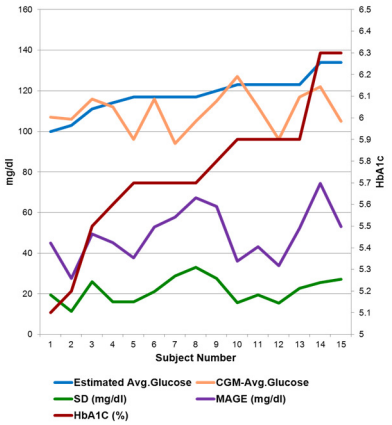
Highest glucose value measured by CGM was more than corresponding OGTT value in 9 out of 15 subjects; the largest difference was of 53 mg/dl.

Time spent
in different blood glucose ranges



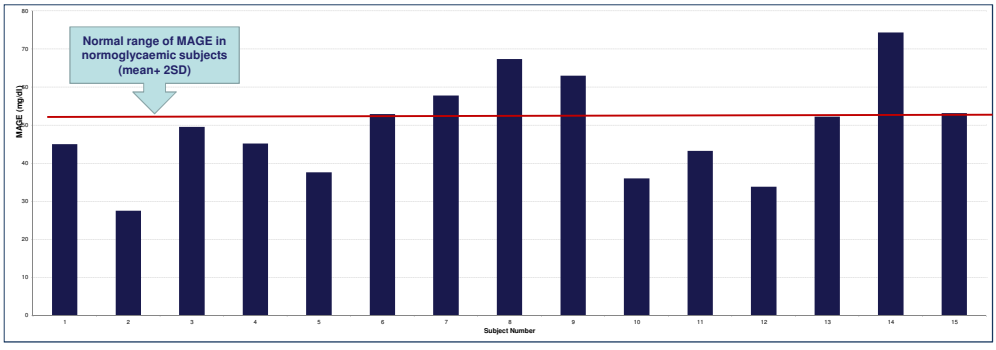
Three subjects spent >17% of their total duration of time in glucose values >140 mg/dl; 3 subjects spent >12% of their total duration of time in glucose values<70 mg/dl. Only one subject had interstitial glucose value of 200 mg/dl for <1% of total duration of time.

Inter-relationship
between measures of glycaemia



There were minor differences between eAG and the average glucose measured by CGM. SD and MAGE differed among prediabetic subjects, irrespective of their HbA1C values.

MAGE- Distribution And Variance From Mean



Variation of MAGE	SD from mean MAGE [1.4 (0.7)]		
	<1	1-2	>2
IFG (n=3)	2	1	0
IGT (n=2)	0	0	2
IFG+IGT (n=10)	2	3	5

* IFG = Impaired Fasting Glucose
** IGT = Impaired Glucose Tolerance

CONCLUSIONS: CGM failed to detect diabetic range hyperglycaemia in women with prediabetes diagnosed by OGTT. Differing patterns of glycaemic variability were observed among prediabetic subjects providing an opportunity to categorize them in a different manner. A prospective study would be required to observe as to whether the categorization based on glycaemic variability has an ability to stratify their risk of developing diabetes and its related complications.

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