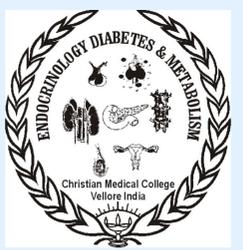




Evaluation of Hypoglycemia unawareness in individuals with Type 1 Diabetes Mellitus using Continuous glucose monitoring (CGM) in a tertiary care center.



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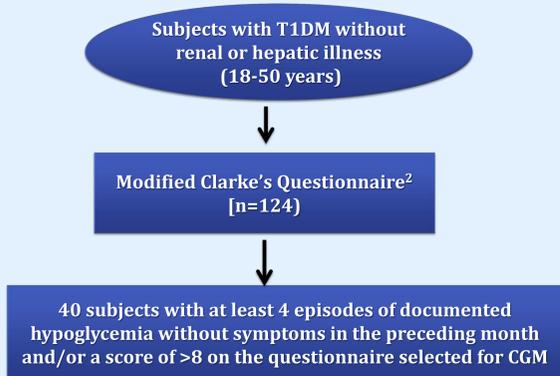
Introduction:

Intensive glycemic control that forms the bench mark in the management of type 1 diabetes mellitus (T1DM) is limited by the risk of hypoglycemia. Repeated episodes of hypoglycemia can lead to development of hypoglycemia unawareness and a six-fold increase in deaths in those experiencing severe hypoglycemia, including the so called "death in bed syndrome". Severe hypoglycemia occurs in 35-42% of T1 DM patients with 90-130 episodes/100 patient years. However, there is lack of data from our population¹.

Objective:

To estimate the prevalence of hypoglycemia unawareness in subject with T1DM utilizing continuous glucose monitoring device.

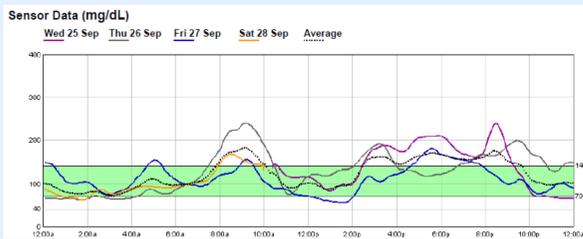
Study design



Methods:

* Forty subjects (31.7%) with documented hypoglycemia without symptoms underwent a 72 hour continuous glucose monitoring (CGM) study using the Medtronic-ipro2 CGM device-MiniMed, Sylmar, CA.

* Interstitial glucose is measured every 5 minutes providing at least 750 readings per subject.



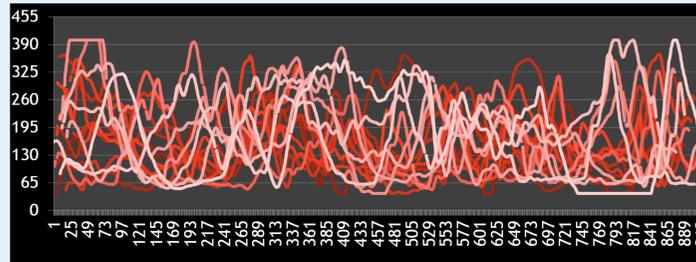
* Subjects also self monitored blood glucose with a glucometer (8 times a day: pre & post meal blood glucose, 12.00 & 3 AM and whenever symptomatic), and also maintained a symptom diary.

* Data was obtained using ipro2 software on the Medtronic website: ipro.medtronic.com

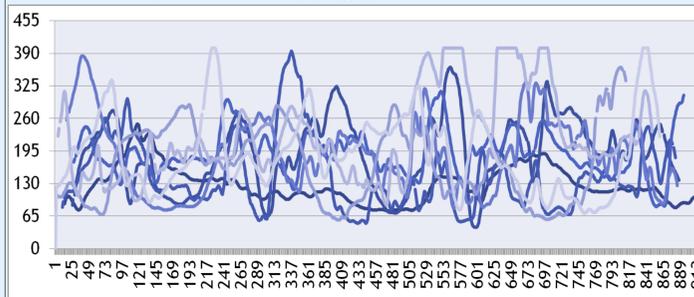
* **Hypoglycemia:** defined³ here operationally as a CGMS reading of ≤ 65 mg/dl [encompassing both asymptomatic and symptomatic hypoglycemia].

Results:

Graphs depicting glycemic variability In the subjects

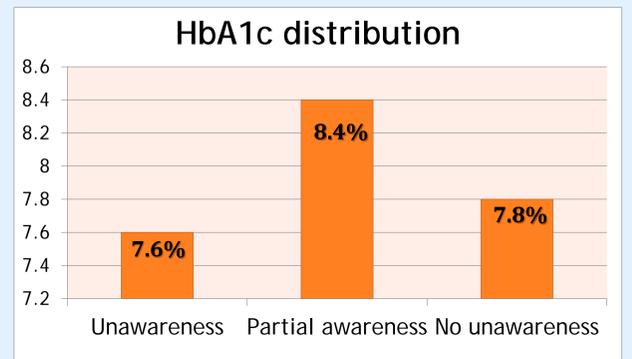
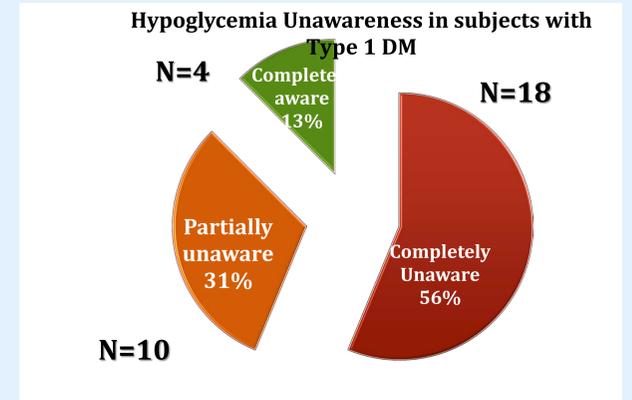
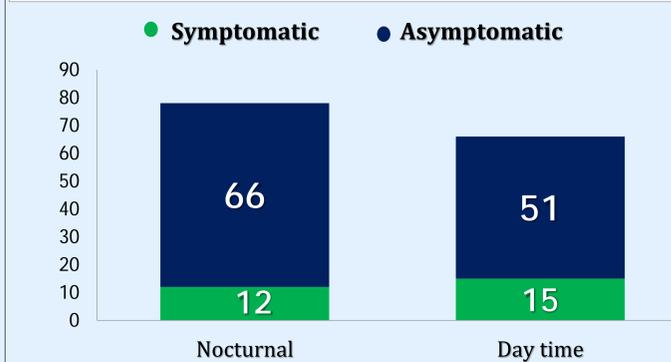
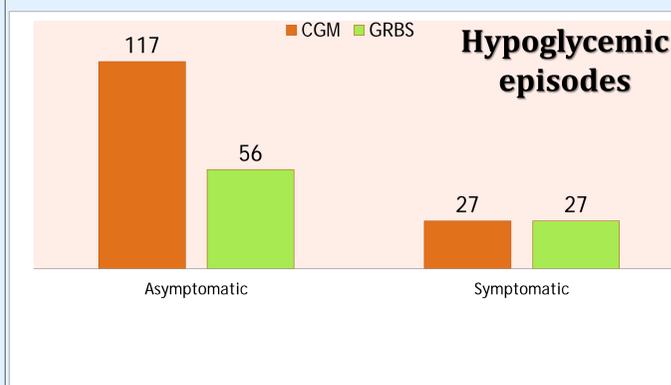


Subjects with hypoglycemia unawareness.



Subjects without hypoglycemia unawareness.

- The mean age of the subjects was 25.2 years (18-42) with a 3:2 male:female ratio.
- CGM documented 144 hypoglycemic episodes in 32 subjects with 4.5 episodes per subject.
- The SMBG records revealed only 83 episodes (43%) less than CGM.
- The mean duration of diabetes was longer in subjects with hypoglycemic unawareness (11.7 vs 7.6 years)



Range: (6 -14.2%) (6.3-8.9%) (6.1-10.6%)

- The mean HbA1c of subjects with hypoglycemia unawareness was lower [7.6%] than those without hypoglycemia unawareness [7.78%] and partial unawareness [8.4%].
- The higher A1c in those with partial awareness may be related to relaxation of therapeutic glycemic targets.

Conclusions:

- * Hypoglycemia unawareness was seen in **one in four (25%)** of subjects with T1DM and more than 50% of the episodes were nocturnal.
- * In comparison to SMBG, CGM identified **42% more** hypoglycemic episodes and hence forms an essential *tool for objective assessment* of hypoglycemia unawareness
- * A reasonable **individualized glycemic goal in T1DM** should be the lowest A1C that preserves awareness of hypoglycemia, preferably with minimal symptomatic or even asymptomatic hypoglycemia.

References:

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2. Clarke WL, Cox DJ, Gonder-Frederick L, et al. Accuracy of perceiving blood glucose in IDDM. Diabetes Care.1985;8 (6):529- 536.
3. Raymond J Davey, Timothy W Jones, Paul A Fournier. Effect of Short-Term Use of a Continuous Glucose Monitoring System with a Real-Time Glucose Display and a Low Glucose Alarm on Incidence and Duration of Hypoglycemia in a Home Setting in Type 1 Diabetes Mellitus. J Diabetes Sci Technol. 2010 November; 4(6): 1457-1464