

Continuous Glucose Monitoring and Hypoglycemia Unawareness in Children and Adolescents with Type 1 Diabetes

Günay Demir, Samim Özen, Hafize Çetin, Şükran Darcan, Damla Gökşen

Ege University School of Medicine Department of Pediatric Endocrinology and Diabetes

Background: Seeking strict normoglycemia in type 1 diabetes mellitus increases the risk of hypoglycemia, exposing to hypoglycemia unawareness. Hypoglycemia unawareness (HU) is defined as the occurrence of hypoglycemic symptoms directly without autonomic symptoms.

Objective and hypotheses:

- to determine the incidence of HU in children and adolescents with Type 1 DM with continuous glucose monitoring system and to assess the effect of structured education to improve awareness

Methods

- randomly selected 39 Type 1 diabetic children and adolescents
- diabetes duration of at least 5 years
- continuous Subcutaneous Glucose Monitoring System, Medtronic Ipro®2 was used to determine HU
- a diary was kept for the symptoms of hypoglycemia
- hypoglycemia defined as sensor glucose level < 70 mg/dl
- patients diagnosed as HU initially undergone a structured education and after 3 months CGMS was used again in HU patients to detect the influence of education

Results:

- Age of the patients, HbA1c and duration of diabetes according to HU are given in Table 1.
- 24 patients were on MDI therapy while the rest were on continuous insulin infusion therapy (CSII).
- 24,5% (n=9) of the patients were diagnosed as having HU with CGMS (Table 1). 6 of them were on MDI, 3 on CSII.
- 27.3% of the patients with a diabetes duration of 5-8 years and 72.7% of the patients with a duration of 8-11 years had HU (table 2).
- HU patients were hypoglycemic for 4,44±3,78 hours, AUC for hypoglycemia was 0,43±0,47 and the number of low excursions were 5,22±3,99. Though AUC and hypoglycemia duration statistically decreased compared to the initial findings, the number of hypoglycemic excursions did not change with structured education (table 3).

	N (%)	Age (years)	Diabetes duration	HbA1c (%)
HU (+)	9 (24,25)	14,8±2,13	7,6±1,45	7,9±0,97
HU (-)	28 (75,5)	13,59±2,47	7,69±1,74	8,4±1,18
p		0,19	0,91	0,23
total	37	13,89±2,42	7,68±1,66	8.0 ± 1.2

Table 1. Age, diabetes duration and HbA1c according to HU

Diabetes Duration	HU (+) n (%)	HU (-) n (%)
5-8 years	6 (27,3)	16 (72,7)
8-11 years	3 (20)	12 (80)

Table 2. HU according to diabetes duration

HU (+)	Before education	After Education	p
No of low excursions	8,33±3,60	5,22±3,99	0,14
AUC	1,81±0,95	0,43±0,47	0,01
Time spent < 70mg/dl (hours)	11,44±5,13	4,44±3,78	0,00

Table 3. Hypoglycemia after structured education

Conclusion: HU is commonly seen in children and adolescents with type 1 diabetes mellitus. Continuous subcutaneous glucose monitoring system is effective in determining HU. Rate of HU can be reduced by structured education.