Frequent and prolonged daytime hypoglycaemia in diabetic children detected by continuous glucose monitoring: A problem of hypoglycaemia unawareness?

Bachmann S, Metzger K, Hess M, Zumsteg U
Pediatric Endocrinology/Diabetology, University Children’s Hospital Basel

The authors have nothing to disclose

Background

Hypoglycaemia represents a common issue in diabetic children, and the achievement of good metabolic control together with the avoidance of hypoglycaemia remains a tightrope walk. As hypoglycaemia is not always recognized, data about hypoglycaemia frequency are limited.

Aims

This study focuses on hypoglycaemia during the day in diabetic children and aims at evaluating:
1. Frequency of hypoglycaemia.
2. Duration of hypoglycaemia.
3. Risk factors for hypoglycaemia.

Patients/Methods

In 60 children with type 1 diabetes mellitus for > 6 months a continuous glucose monitoring was performed for 6 days. 51 patients had a complete record.

Daytime hypoglycaemia was defined as any sensor glucose excursion < 3.7mmol/l during the day. Hypoglycaemia was classified as symptomatic if the patient noted symptoms of hypoglycaemia at the time of occurrence.

6 day measurement

Logbook

Continuous glucose monitoring

Capillary blood glucose, insulin, carbohydrates, bed time, wake up time, hypoglycaemia symptoms

Results

1. Hypoglycaemia frequency

182 episodes of daytime hypoglycaemia (3.5/patient/6days)
33 (18%) symptomatic, 149 (82%) asymptomatic
44% of all episodes: glucose < 3mmol/l

2. Hypoglycaemia duration

60% of the episodes lasted for more than 30min and 25% more than 1 hour.
The maximum duration was 6.5 hours.

3. Risk factors

The duration of the longest hypoglycaemic episode was associated to diabetes duration (p<0.05, r = 0.3).

This means that hypoglycaemia was more prolonged in patients with a longer duration of diabetes.

Frequency or duration of daytime hypoglycaemia was not associated to: HbA1c (p 0.08/0.07)
Age (p 0.58/0.47)
Insulin dosage (p 0.88/0.59)
% basal insulin (p 0.14/ 0.68)

Type of treatment (MDI/CSII): no difference in frequency or duration of hypoglycaemia.

Table 2: Comparison of treatment groups (mean and range)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Multiple injection</th>
<th>Pump</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of episodes</td>
<td>3 (0-10)</td>
<td>4.1 (3.1)</td>
<td>0.1</td>
</tr>
<tr>
<td>Total duration [min]</td>
<td>113 (0-310)</td>
<td>218 (0-310)</td>
<td>0.36</td>
</tr>
<tr>
<td>Longest episode [min]</td>
<td>64 (0-390)</td>
<td>78 (0-275)</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Conclusion

Hypoglycaemia is frequent in diabetic children, and even during daytime when patients are awake, most of the episodes are asymptomatic and can be prolonged.

In our study, tight metabolic control or high insulin dosage did not increase the risk for hypoglycaemia.

Longer diabetes duration is a risk factor for prolonged hypoglycaemia.

These data reveal the importance of hypoglycaemia unawareness and impaired counterregulation already in childhood.