Psychological Impact of Severe Hypoglycaemia on Fear of Hypoglycaemia and Diabetes-related Distress: Baseline Assessment in Participants of the HypoDE Study

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BACKGROUND AND AIMS

Hypoglycaemia has long been described as the main limiting factor in intensified insulin therapy. While mild hypoglycaemia can occur several times a week (or even day) and can be handled by the patient her/himself, severe hypoglycaemia, which require the help of others to recover, occur less frequently but are more dramatic for patients.

To understand the impact of severe hypoglycaemia (SH) on patients, we analysed the psychological profile of people with type 1 diabetes who had experienced at least one episode of severe hypoglycaemia (SH: third party assistance for recovery) and compared it with patients without a recent SH episode.

MATERIALS AND METHODS

Baseline data of 149 participants of the HypoDE study were analysed. Patients with type 1 diabetes on a multiple daily insulin injections (MDI) regimen and hypoglycaemia problems were eligible for the HypoDE study. Hypoglycaemia problems were defined as having suffered a SH episode during the past 12 months or having reduced hypoglycaemia awareness.

Participants wore a blinded rtCGM system(Dexcom G4) for 28 days and completed the Hypoglycaemia Fear Survey (HFS) and the Diabetes Distress Scale (T1-DDS).

- The HFS has two subscales: Worry and Avoidance behaviour.
- The T1-DDS has seven subscales covering the different sources of distress: Powerlessness, Management distress, Hypoglycaemia distress, Negative social perceptions, Eating distress, Physician distress, and Family distress.

RESULTS

- Sample characteristics can be seen in Table 1. Participants who experienced SH did not differ from participants without SH regarding age, gender, diabetes duration, and insulin dose.
- However, participants who experienced SH had a lower HbA1c and a lower Hypoglycaemia Unawareness Score.
- The glycaemic profile of participants with and without SH can be seen in Figure 1 and 2. Participants with SH spent almost 60 minutes more in the hypoglycaemic range (≤ 70 mg/dl) but approx. 120 minutes less in the hyperglycaemic range (> 180 mg/dl) during the baseline blinded CGM phase. Time-in-range (>70 - ≤ 180 mg/dl) did not differ.
- As can be seen in Figure 2, participants with SH spent significantly more time in various hypoglycaemic ranges and had more hypoglycaemic events ≤ 55 mg/dl than participants without SH.
- The total score of the HFS as well as the worry and behaviour subscales were significantly higher in participants with SH (Figure 3).
- The total score of the DDS as well as all subscales except management distress were significantly higher in participants with SH (Figure 4 and 5). The impact of SH was greatest for physician distress (d = 0.55), family distress (d = 0.52), powerlessness (d = 0.49), and hypoglycaemia distress (d = 0.45) (Figure 5).
- Figure 6 shows the associations of HFS and DDS subscales with duration in hypo-, eu-, and hyperglycaemic ranges for all participants at baseline. Overall diabetes-related distress as well as negative family arguments, negative social perceptions, and hypoglycaemia distress were significantly associated with more time spent ≤ 70 mg/dl. The HFS worry subscale showed significant associations with less time > 180 mg/dl, more time in euglycaemic range, but also more time ≤ 70 mg/dl.

CONCLUSION

The HypoDE study analysed patients who all had problems with hypoglycaemia (either SH or reduced awareness). The specific impact of having previously experienced an episode of SH could be seen in many areas of living with diabetes. The psychological impact of SH was strongest regarding family arguments which demonstrates the effect of SH and the reliance on others on family life. Also, the feeling of powerlessness was significantly increased in those participants who experienced an event of SH which highlights the importance of empowerment-based approaches in these patients. Interestingly, the impact of SH could also be seen in physician-related distress.

Avoidance of hypoglycaemic glucose values was also more prominent in participants with SH. More diabetes distress and more worries about hypoglycaemia were not only associated with the occurrence of SH but also with the duration of low glucose values.

Besides the reduction of biochemical and clinical hypoglycaemia, also specific areas of distress such as powerlessness, family distress, and hypoglycaemia-related distress should be addressed in this specific group of patients with diabetes.

Table 1: Sample characteristics

Sample characteristics Mean (SD) or %	All N=149	With SH n = 90	Without SH n = 59	p
Age in years	46.5 (11.9)	46.1 (11.5)	47.2 (12.5)	.578
% female	40.3 %	42.2 %	37.3%	.551
Diabetes duration in years	21.3 (13.9)	22.6 (13.9)	19.1 (13.7)	.125
HbA1c in %	7.5 (1.0)	7.2 (1.0)	7.8 (0.9)	.001
Insulin dose in IU/KG	0.5 (0.3)	0.5 (0.3)	0.6 (0.3)	.431
Hypoglycaemia Unawareness score (range 0 – 7)	4.9 (1.2)	5.0 (1.5)	4.6 (0.6)	.018

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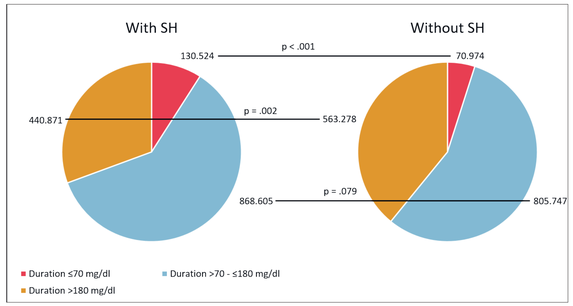

Figure 1: Duration of time spent in hypo-, eu-, and hyperglycaemic ranges (in min/day) of people with and without SH

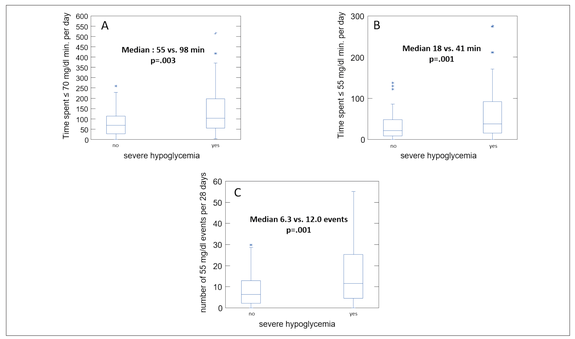

Figure 2: Difference of duration of different hypoglycaemic phases or number of ≤ 55 mg/dl hypoglycaemic events in people with and without severe hypoglycemia (A ≤ 70 mg/dl; B ≤ 55 mg/dl; C # of ≤ 55 mg/dl events)

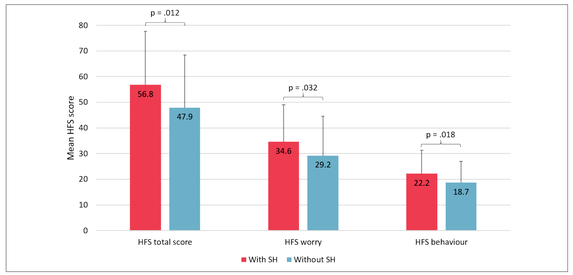

Figure 3: Differences in the HFS scale between people with and without SH

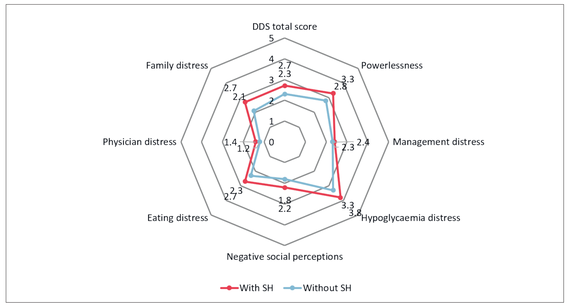

Figure 4: Pattern of distress between people with and without SH

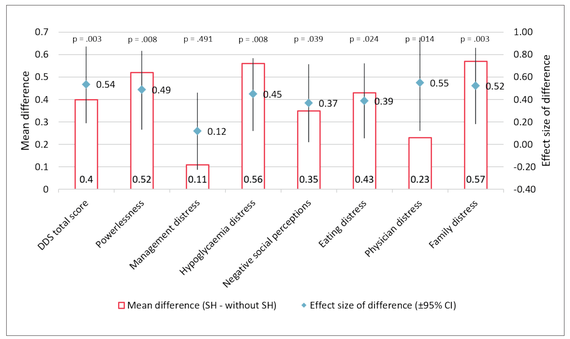

Figure 5: Mean differences and effect sizes of differences (± 95% CI) in the DDS scale between people with and without SH (p-values according to t-test)

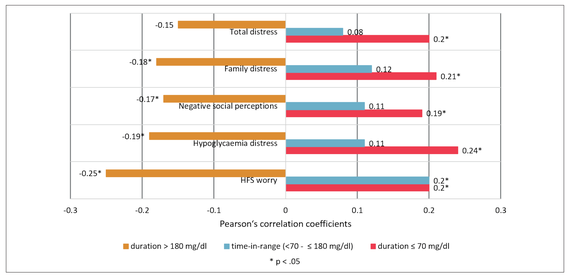

Figure 6: Associations with duration of hypo-, eu-, and hyperglycaemic ranges