

Glucose Fluctuations and Heart Rate Variability in Type 2 Diabetic Patients: The Results of Simultaneous Glucose and ECG Monitoring

Session Monday General Poster Session

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The heart rate variability (HRV) analysis is a commonly used tool for assessment of autonomic function in diabetic subjects. Nevertheless, the influence of glucose fluctuations on HRV remains to be clarified. In this study we compared HRV parameters in fasting and postprandial state and during episodes of hypoglycemia in type 2 diabetic patients treated with insulin. We also assessed the relationship between HRV and glucose variability (GV) in these subjects.

Seventy free patients, 48-78 years of age, underwent simultaneous continuous glucose monitoring (CGM) and Holter recording. CGM-defined GV parameters, including Lability Index (LI), J-index, Mean Average Glucose (MAG), Low Blood Glucose Index (LBGI) and High Blood Glucose Index (HBGI), were calculated for day-time and nocturnal hours. Hypoglycemia was defined according to ADA threshold (≤ 3.9 mmol/L). Frequency-domain measures of 24-h HRV, i.e., the high-frequency (HF) and low-frequency (LF) band, were estimated.

Daytime LF/HF ratio was lower in the postprandial state as compared to that of fasting (<0.0001). Postprandial LF/HF ratio correlated negatively with day-time mean glucose ($r=-0.29$), LI ($r=-0.3$), J-index ($r=-0.32$), HBGI ($r=-0.33$) and MAG ($r=-0.33$, all $p<0.05$). Hypoglycemic excursions were registered in 25 patients. The values of LF, HF and LF/HF ratio increased markedly during hypoglycemia (all $p<0.01$) and were similar for nocturnal and daytime hypoglycemic events. Patients with autonomic neuropathy as compared to those without demonstrated a decline in LF in the fasting state and during hypoglycemia ($p<0.05$). Mean daytime LF/HF ratio correlated with previous night LBGI ($r=0.34$, $p=0.03$) and mean nocturnal glucose ($r=-0.32$, $p=0.04$). The glucose postprandial and hypoglycemic excursions enhancing the indexes of GV affect sympatho-vagal balance in patients with type 2 diabetes treated with insulin. The effects should be taken into account when interpreting HRV data.

Keywords Heart Rate Variability, Glucose Variability
