Chronic complications versus glycaemic variability, time in range and HbA_{1c} in people with type 1 diabetes: sub study of the RESCUE-trial

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Abstract:

Background and aims: So far, HbA1c is the only metric of glucose control showing a strong association with chronic complications. However, it does not reflect short-term glycemic variability nor provides guidance in decreasing risk of hypoglycemia. More widespread use of continuous glucose monitoring (CGM) has changed the way people with type 1 diabetes (T1D) manage their glycemia by providing information about glycemic variability and time spent in different glucose ranges.

Materials and methods: Parameters that could have a link with diabetes complications were analyzed of 515 adults with T1D who entered the Belgian reimbursement system for real-time CGM (rtCGM): HbA1c, standard deviation (SD), coefficient of variation (%CV), time in range (TIR, 70-180 mg/dL), age, diabetes duration, BMI, and gender. Association between glucometrics from the first 2 weeks of rtCGM use and presence of the following diabetes complications at start were investigated with multiple logistic regression: composite microvascular complications (defined as presence of at least 1 of the following: peripheral or autonomic neuropathy, retinopathy, nephropathy), macrovascular complications, and hospitalization for hypoglycemia and ketoacidosis.

Results: Diabetes duration (OR=1.12, P<0.001) and TIR (OR=0.97, P=0.005) were independently correlated with composite microvascular complications. For nephropathy, diabetes duration (OR=1.08, P<0.001) and HbA1c (OR=1.65, P=0.012) were independently associated. For retinopathy it were diabetes duration (OR=1.14, P<0.001) and TIR (OR=0.96, P<0.001). For peripheral and autonomic neuropathy it were diabetes duration (OR=1.09, P<0.001; OR=1.08, P<0.001) and SD (OR=1.03, P=0.026; OR=1.035, P=0.015). Age (OR=1.08, P=0.003) and HbA1c (OR=1.80, P=0.044) were independently correlated with macrovascular complications. Only TIR (OR=0.97, P=0.021) was independently associated with hospitalization for hypoglycemia or ketoacidosis.

Conclusion: Shorter TIR was associated with the presence of composite microvascular complications, and with retinopathy in particular. A higher SD was linked to peripheral and

autonomic neuropathy. For hospitalization due to hypoglycemia or ketoacidosis, TIR was the most important factor.