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Increased Physical Activity Patterns Above Current Guidelines Does Not Increase Glucose Variability in Type 1 Diabetes

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Background:

High glucose variability (GV) has been associated with hypoglycemia in persons with type 1 diabetes (T1D), which may result in coma or death. The role of daily physical activity (PA) for overnight and next-day glucose control is poorly understood.

Objective:

A multi-site observational study was undertaken to observe the impact of achieving moderate-vigorous physical activity (MVPA) guidelines on glycemic profiles.

Methods:

Twenty-five participants (15 female; 25±6 years; HbA_{1c} 7.6±1.1%; duration of diabetes 9±11 years) wore continuous glucose monitors (CGM) and accelerometers for six days. Participants yielded 125 independent days of PA and CGM data, which were stratified into three groups: (1) Below guideline days – did not achieve 30 minutes of MVPA/day; (2) Meeting guideline days – accumulated 30-59.9 minutes MVPA/day and (3) Training days – achieved ≥60 minutes MVPA/day. GV was calculated using Continuous Overall Net Glycemic Action (CONGA) and Mean Absolute Glucose (MAG) change, for both overnight and next-day periods.

Results:

No significant differences were observed between below guidelines, meeting guidelines and training days for mean glucose (8.4±2.9, 8.5±2.6, 8.8±3.1 mmol/L, respectively, $p=0.58$), overnight MAG (2.5±1.0, 2.4±1.1, 2.3±0.9, $p=0.79$), or overnight CONGA-4 (2.1±1.7, 2.0±1.1, 2.0±1.3, $p=0.65$). These differences remained insignificant when comparing next-day values (mean glucose $p=0.86$, MAG $p=0.18$, CONGA-4 $p=0.34$).

Conclusion:

Achieving or exceeding daily MVPA targets was not associated with better glucose control or reduced GV in persons with T1D; however, further investigations with a larger sample size and various exercise modalities is warranted.