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Risks of glycaemic excursions around exercise sessions and the days without exercise when implementing a 2-month combined

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Context

Physical activity is associated with decreased risk of cardiovascular disease, improved quality of life and type 1 diabetes (T1D) management. In order to individualise recommendations when implemented chronic exercise interventions, it seems important to better identify the glycaemic excursions (hypo and hyperglycaemia) occurring the days including supervised exercise training sessions compared with the days without training. Whether these glycaemic profiles are changing throughout several months of training is also questionable.

Methods

Study Design: Longitudinal study over 2 months with a supervised exercise intervention for adults with T1D.

Participants: 19 adults (13 ♀) with T1D participated in 2-3 supervised aerobic and strength training sessions weekly (90 minutes each). 9 used continuous subcutaneous insulin infusion and 10 used multiple daily injections; no closed-loop systems were used.

CGM: Glycaemic excursions were assessed during:

- 24-hour (*i.e.*, 8 A.M. to 8 A.M.) and nocturnal (*i.e.*, midnight to 6 A.M.) periods.

Glycaemic Metrics: We focused on metrics recommended by international consensus, including time in normoglycemia, level 1 and 2 hypoglycaemia (*i.e.*, <3 and <3.9 mmol.L⁻¹), and level 1 and 2 hyperglycaemia (*i.e.*, >10 and >13.9 mmol.L⁻¹).

Statistical Analysis: Linear mixed models and logistic regressions were used to compare days with and without exercise, along with time effects and their interactions.

Results

Impact of exercise days

- Lower hyperglycaemic (level 1 and 2) risk and higher time spent in normoglycaemia the **nights** following an exercise day compared to nights without previous exercise. These differences diminished over training weeks.
- **24-hour periods:** no significant impact for exercise presence.

During nights

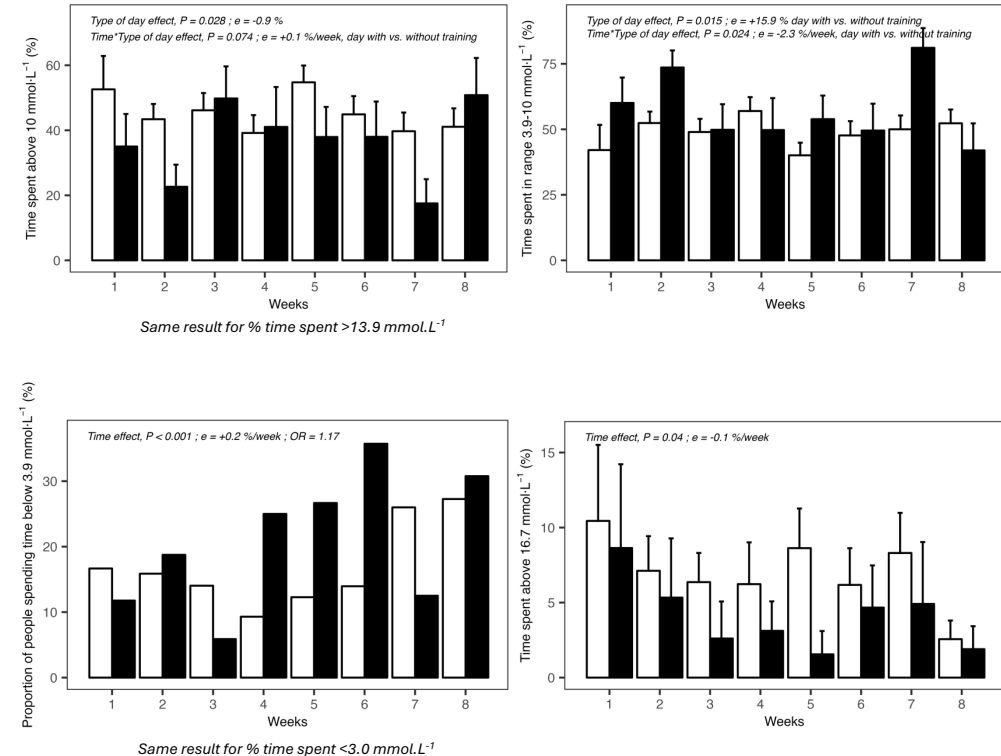
- Hypoglycaemic risk (level 1 and 2) increased with training weeks
- Severe hyperglycaemia (>16.7mmol.L⁻¹) decreased with training weeks

During 24-hour period

- Hyperglycaemic risk (level 1 and 2) decreased with training weeks (data not shown)

Without any influence of type of day (*i.e.*, with or without exercise day)

Weekly training progress with distinction between post-training (black bars) and no-training (white bars) nights of glycaemic metrics.



Conclusion

Although acute exercise (*i.e.*, day with vs. without a training session) reduced nocturnal hyperglycaemia without increasing the risk of hypoglycaemia, this risk of hypoglycaemia progressively increased after several weeks of training, during the nights, even those not subsequent to an acute exercise. For patients with T1D who engaging in regular physical activity, it is crucial to be vigilant about post-exercise glycaemic excursions, particularly at night.