Research findings

Effect of Hyperglycaemia (in Higher and Low Insulin States) on Exercise Performance

Age Range: 14 to 30 years

WHAT WAS THE AIM?

It is unclear if and how short term high blood glucose levels affect exercise performance in young people with type 1 diabetes.

The aim of this study was to study the effect of short term high blood glucose levels on performance across a range of exercise skills. We also wanted to determine if short term high blood glucose levels with low and higher insulin levels would affect exercise performance differently.

HOW DID WE DO IT?

Recreationally active study participants completed different exercise testing under three conditions in random order: euglycemia (blood glucose of 5 mmol/l) with higher insulin, hyperglycaemia (blood glucose of 17 mmol/l) with low insulin and hyperglycaemia with higher insulin. These test conditions were tightly controlled using insulin and glucose given through a drip. Participants and the exercise testing assessor did not know their blood glucose or insulin at the time of exercise testing. The following exercise tests were performed: sprint cycling, maximal hand grip strength, single leg balance, vertical jump, dynamic balance, reaction time and an aerobic fitness ($\dot{V}O_2$ peak) test conducted on a stationary bicycle.

WHAT DID WE FIND?

We found that short term high blood glucose levels with either the low or higher insulin state had no consistent effect across the exercise tests performed. In some exercise tests, small differences were seen between euglycaemia and either one (but not both) of the high glucose level conditions: sprint cycling peak power was better in the high glucose level with low insulin condition, reaction time was slower in the high glucose level with low insulin condition and $\dot{V}O_2$ peak was lower in the high glucose level with higher insulin condition. Comparisons between conditions for other exercise tests did not show a difference.

Overall our findings suggest that exercise performance is minimally affected by short term high blood glucose levels in recreationally active young people with type 1 diabetes. Our full findings are published in Diabetologia: https://link.springer.com/article/10.1007%2Fs00125-021-05465-9

WHAT DOES THIS MEAN IN PRACTICE?

Whilst recreationally active, young people with type 1 diabetes should strive for good glycaemic control for its well-established benefits, our results indicate that if they experience short term high blood glucose levels prior to and/or during exercise they can still perform well. And if they can continue to perform well hopefully they will continue to be involved in sport and physical activity for all its benefits.

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