Serum Glucose and Insulin Concentration Responses after Ingestion of Highly Branched Cyclic Dextrin before Prolonged Running

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ABSTRACT:

Problem statement: Highly branched cyclic dextrin (HBCD), a novel type of polysaccharide (maltodextrin), is an ergogenic aid that can improve endurance exercise performance [1]. An earlier rodent study found that the low insulin responsiveness of HBCD may have influenced blood glucose concentration and energy substrate oxidation in mice [2]. However, there is limited information on the effects of HBCD consumption on glucose and insulin concentrations during endurance exercise. Purpose: We primarily aimed to investigate the effects of HBCD ingestion compared to maltodextrin on plasma glucose and insulin concentrations as well as glucose fluctuation during endurance running in recreational male endurance runners. Methods: Nine male marathon runners completed the randomly assigned in a double-blind crossover design to consume the beverage containing 1.5 g·kg body mass⁻¹ of HBCD or maltodextrin (MD) 60 min before each a 15-min running economy test followed by a 60-min constant load running at a speed equivalent to 70% of their VO₂peak. Venous blood was sampled before ingestion, 30-min after ingestion, immediately prior to and post-exercise, and every 30 min during exercise test for measurement of plasma glucose and insulin. Glucose fluctuation, expressed as percentage, was calculated as the maximal difference in absolute glucose values assessed during the endurance exercise. Results: There were no between-condition differences found for serum glucose concentration over the period of trials. There was a significant difference between group effect for serum insulin concentration at the end of exercise (time point of 75 min) between the MD (3.94 ± 2.53 µU·mL⁻¹) and HBCD (3.41 ± 0.94 µU·mL⁻¹) group (p < 0.001). The ingestion of HBCD resulted in significantly more glucose fluctuation compared with the MD (47.77 ± 26.19 % vs. 41.65 ± 10.40 %, p = 0.04). Conclusion: HBCD ingestion led to lower insulin concentration compared to maltodextrin at the end of a 75-min exercise, while no between-condition differences were observed for serum glucose concentration. Moreover, blood glucose fluctuations were elevated during constant load running after HBCD ingestion.

KEY WORDS Highly Branched Cyclic Dextrin, Maltodextrin, Endurance Running, Glucose, Insulin

Reference:
