Effect of Intensity of Exercise on Substrate Utilization During Exercise in Patients with Type 2 Diabetes

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Abstract

Introduction: The exercise has been recommended to type 2 diabetes (T2D) in order to improve glycemic control which related to substrate utilization. Carbohydrate and fat metabolism were considered factors. Nevertheless, substrate utilization in these patients is still unclear especially during acute bout exercise. Therefore, the objective of this study was to determine substrate utilization at rest and during exercise at three intensities in male patients with T2D.

Methods: Eight male patients with T2D randomly cycled on ergometer at 25% (low), 65% (moderate) and 85% (high) peak oxygen consumption (VO_{2peak}) for 10, 10 and 5 minutes respectively with at least 7 days apart. Expired gas samples were collected throughout the exercise test.

Results: Carbohydrate oxidation rate was increased from baseline during exercise at all intensities and increasing with the intensity. Fat oxidation rate was increased from baseline during low-intensity exercise but decreased with the intensity ($P<0.05$). Fat oxidation rate was lower than baseline during exercise at moderate- and high-intensity. Carbohydrate had more contribution to total energy expenditure than fat at rest and during exercise at all intensities. The highest fat oxidation rate was found at low-intensity exercise.

Conclusions: The results suggested that patients with T2D relied more on carbohydrate than fat at rest and during exercise regardless of exercise intensity. Highest fat utilization was at low-intensity exercise.

Keywords: Exercise, Type 2 diabetes, Carbohydrate utilization, Fat utilization