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The Acute Effects of Exercise Intensity on Blood Glucose Levels in Type 1 Diabetics

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(No relevant relationships reported)

For individuals with Type 1 diabetes mellitus (T1DM), regular physical activity is a fundamental strategy in the management of glycemic control. Previous studies have shown that continuous, moderate-intensity exercise in individuals with T1DM decreases blood glucose concentrations, often resulting in hypoglycemia, whereas vigorous-intensity exercise can increase blood glucose, impacting the risk of hyperglycemia. Sprint interval training (SIT), characterized by brief, all-out bursts of supramaximal exercise, has been shown to improve indices of cardiometabolic health, despite a minimal time commitment. However, the effects of low volume SIT on individuals with T1DM is largely unknown.

PURPOSE: to contrast the acute effects of exercise intensity on blood glucose levels in Type 1 diabetics.

METHODS: Four recreationally active college- age students with T1DM, completed a treadmill test to determine maximal aerobic speed (MAS), and performed each of the following 20-min treadmill-based protocols: 1) Moderate-intensity continuous training (MICT): 5-min warm-up (WU), 10 minutes at 70% MAS, 5-min cool-down (CD); 2) high-intensity interval training (HIIT): 5-min WU, 1-min at 90% MAS, 1-min at 30% MAS repeated 5 times, 5-min CD; 3) SIT: 5-min WU, 30-sec at 120% MAS, 2-min, 50-sec at 30% MAS repeated 3 times, 5-min CD. Blood glucose was monitored via glucometer every 5-min during exercise and for 45-min after.

RESULTS: A statistically significant decline in blood glucose was observed in both the MICT and HIIT conditions ($p < 0.001$, respectively) but not in the SIT condition ($p = 0.696$). From baseline to the 45-min mark, blood glucose decreased by 27% in both the MICT (180 ± 27 to 132 ± 39) and HIIT (183 ± 29 to 132 ± 15) protocols, but only 11% in the SIT (193 ± 41 to 165 ± 70) protocol.

CONCLUSIONS: The results of this study provide initial proof-of-concept that a low volume SIT protocol can maintain target blood glucose levels while exercising in individuals with T1DM.

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Exercise Reduces HbA1c in Type 2 Diabetics, but Improved Strength Associates with Poorer Outcomes

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(No relevant relationships reported)

More than 25 million Americans have type 2 diabetes. Exercise is an effective method to prevent, delay, or manage the disease; however, fewer than 40% of patients report engagement in physical activity and more than 20% of this group overestimate their engagement. Structured exercise is warranted. Both aerobic and resistance training may be more effective than either mode in isolation, but studies reporting this are limited by their combined groups having greater volumes of exercise.

PURPOSE: To evaluate different volumes of combined aerobic and resistance exercise on HbA1c levels in adults with diabetes.

METHODS: 67 patients were randomly assigned to one of two groups: Group 1 performed supervised aerobic and resistance exercise twice per week. Group 2 performed the same exercise as Group 1 but also walked for 60 min on two additional days. At baseline, health history, seven tests of physical functioning, and measured cardiometabolic parameters, including HbA1c was performed. Following 10 weeks of exercise, follow-up data were collected. Independent-samples t tests compared baseline data and rates of improvement between the two groups. Multiple linear regression tested predictors of improvement in HbA1c.

RESULTS: Group differences at baseline were minimal. Patients in Group 2 were 4.7 years older ($p=0.063$), body mass index was 3.3 points lower ($p=0.058$), and they walked an additional 72.7 meters in the 6-minute walk ($p=0.009$). There were no differences in body fat percent ($p=0.507$), HbA1c ($p=0.512$), other cardiometabolic parameters, or the other six assessments of physical functioning. The patients who completed the exercise intervention improved in 13 of 15 assessments ($p<0.05$), including HbA1c ($p=0.045$). There were no differences in improvement between exercise groups. Regression analysis found elevated baseline body fat percent ($p=0.001$) and improvements in strength, assessed by arm curls ($p=0.009$) and grip strength ($p=0.042$) to correspond to poorer outcomes in HbA1c; the overall model was significant ($R^2=0.733$; $p<0.001$).

CONCLUSIONS: Ten weeks of combined aerobic and resistance exercise improved cardiometabolic profiles of diabetic patients, including HbA1c. Additional volume of aerobic exercise did not enhance outcomes and improvements in strength associated with poorer outcomes.

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The Effects Of Simulated Hypoxia Bouts On Resting Blood Glucose Levels And Hemodynamics Of A Type 1 Diabetic: A Case Study

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(No relevant relationships reported)

Individuals diagnosed with diabetes may choose adventure travel vacations at higher altitudes, thereby perturbing formerly controlled sea level (SL) blood sugar (BG) levels.

PURPOSE: We sought to describe change in resting BG concentration, heart rate (HR), and mean arterial pressure (MAP) during repeat acute exposure to simulated altitude bouts in a type 1 diabetic (T1D) vs a non-diabetic (ND). We hypothesized T1D would encounter less stable readings on all variables.

METHODS: Two male participants (n=2), a T1D and ND, 22 and 23 years old, respectively, completed this case study. Participants, simultaneously, visited a lab on six different days [i.e., three days in a row one week (M, T,
W) and the same three days the following week (M, T, W)]. They ingested the same meals the night before and day of (1.5-hrs before chamber use). At each visit, BG (Contour Next Link; Parsippany, NJ), HR (Polar, Lake Success, NY), and MAP (Briggs Healthcare, Waukegan, IL) were assessed at rest at SL and during 2-hr/bouts at 10-min intervals using a hypoxic chamber (Hypoxico Inc., New York, NY) set randomly to varying altitudes: SL; 915 m; 1,829 m; 2,743m; 3,658m; and 4,572m.

RESULTS: For each variable, magnitude of change (Δ) was averaged over the 6 lab visits and compared at SL and across altitude levels. SL ΔBG (mg/dL), ΔHR (bpm), and ΔMAP (mmHg) for T1D and ND, respectively, were: 19, 16, 18; and 34, 18, 12. T1D maintained a more stable BG at SL over 6 days. When averaging the five altitude levels over 6 days, ΔBG (mg/dL), ΔHR (bpm), and ΔMAP (mmHg) for T1D and ND, respectively, were: 58, 9, 10; and 47, 9, 10. Notably, T1D had a less stable BG during hypoxic exposure.

CONCLUSION: Simulated hypoxia perturbed BG to a greater extent in T1D. This could have practical application for when a T1D travels to higher, natural elevations, at which point they should more closely monitor their BG levels with normal food and fluid intake.

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Effects of Aerobic Exercise on Plasma Metabolites in Prediabetes Subjects

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(No relevant relationships reported)

OBJECTIVE: Regular exercise can improve the insulin sensitivity in Prediabetes(PDM). However, the mechanisms remain unclear. This study aimed to examine the effect of aerobic exercise on PDM subjects' plasma metabolites.

METHODS: 24 PDM subjects were selected [mean age of (54.41±10.34) yr, body mass index of (25.70±3.80)kg/cm^2, 8 males]. Each 10 age and sex-matched normal subjects and new-onset T2DM subjects were enrolled. PDM subjects received exercise (n=13) or health education (n=12) for 12 weeks. Exercise training: 3 times/week, 50 min per session at 40%-60% of of VO_2 reserve. The body composition (dual-energy x-ray absorptiometry) and cardiorespiratory fitness (VO_2peak) were detected before and after exercise. Plasma metabolites were analyzed by using liquid chromatography/mass spectrometry (LC/MS).