Title

The impact of a combined aerobic and resistance exercise programme in preventing or delay to the onset of diabetes for subjects at risk

Abstract

Introduction: Prediabetes describes a condition whereby an individual's level of blood glucose is above normal level, though not high enough to warrant them a T2D diagnosis. The condition is classified into two categories; impaired glucose tolerance (IGT) where blood glucose levels are above the normal 2 hours after glucose loading in the oral glucose tolerance test but not so high to warrant the classification as diabetes. The other is impaired fasting glucose (IFG) where blood glucose have risen to a fasting state but yet again, not so high to warrant the classification as diabetes. Physical exercise improves BG homeostasis but the extent to which exercise is effective strategy as primary prevention mechanism for people whom at risk to develop diabetes is not fully understood.

Purpose: To examine the effects of 6-weekes moderate-intensity combined aerobic and resistance exercise program in preventing or delaying the onset of diabetes for subjects at risk compared to sedentary non-diabetic individuals. **Methods**: 20 subjects of a sedentary lifestyle, diagnosed with either prediabetes or at risk to developed T2D (PRE-D) and 5 Subjects were sedentary healthy individuals (ND) met the inclusion criteria. Both PRE-D and ND have been asked to complete 6-weeks of moderate-intensity combined aerobic and resistance exercise for 60 minutes on two days/week. Each exercise session consists of a combined exercise protocol of 30 minutes of resistance exercise (3 sets of 10 repetitions) followed by 20 min cycling. The primary outcome is to concentrate on metabolic results, such as improved HbA1c, blood pressure, heart rate, 1-repition max, lipid profile (reduction in Total Cholesterol, Low Density Lipoproteins, Triglycerides or increase High Density Lipoproteins) and improvements in insulin sensitivity determined by responses to oral glucose tolerance tests on independent days. **Results**: There were significant reduction (p=0.00) on the HbA1c after applying of 6 weeks' combination exercise intervention in both groups comparing to baseline. OGTT indicated significant differences between Pre Exercise & Post 12th exercise session in both groups with p=0.01. BG concentrations were reduced post each exercise session and was significant Post-EX S12 comparing PRE-EX to P= 0.00 and P= 0.09 in PRE-D and ND respectively. A significant reduction in TC (P= 0.04) and LDL (P= 0.02) in PRE-D only. SBP drops from

127.3±13.1 to 119.6±8.4 mmHg with P= 0.04 in PRE-D while in ND was not significant. HR was significantly reduced (P=0.01) and goes from 73.5±10.3 to 70.3±12.1 in PRE-D and was significantly reduced (P= 0.03). A significant reduction in RPE have been achieved with P=0.00 in PRE-D and P=0.03 in ND group.1RM improved significant in back (P=0.04) and triceps (P=0.04) in PRE-D, while in ND group the significant improvement was in squat (P=0.02) and back (P=0.02). **Conclusion**: A combination exercise programs, which involves both RE, and AE performed at moderate intensity (50 – 60% of 1RM) over 6-weeks period can be feasible and economical prevention strategies to minimize the risk factors for T2D in prediabetes subjects