FACTORS EXPLAINING IMPROVED GLUCOSE TOLERANCE AND INSULIN SENSITIVITY DURING FIVE-YEAR EXERCISE TRAINING AND DIETARY COUNSELING INTERVENTION AMONG SUBJECTS WITH IMPAIRED GLUCOSE TOLERANCE

Aunola Sirkka¹, Kylliäinen Arja¹, Paturi Merja², Hämäläinen Helena³
(Department of Health and Functional Capacity, Laboratory for Population Research, National Public Health Institute, Turku¹, Department of Health Promotion and Chronic Disease Prevention, National Public Health Institute, Helsinki², Research Department, Social Insurance Institution, Turku³, Finland)

The purpose of this study was to examine which factors explain the responses in glucose tolerance and insulin resistance during a five-year exercise training and dietary counseling intervention among subjects with impaired glucose tolerance.

The subjects are a subgroup from the Finnish Diabetes Prevention Study [1]. The subjects who participated in the exercise intervention in Turku (n = 42) were included in the present study. Their age, height, weight and BMI were 54 ± 8 yrs, 169 ± 9 cm, 88 ± 11 kg and 31 ± 4, respectively. The intervention covered a period of 5 years. It included supervised, progressive, individually tailored power type of resistance training twice a week, supplemented with endurance exercise (walking, jogging, swimming, skiing, aerobic ball games). The subjects were also individually encouraged to increase their daily physical activity. Dietary counseling was given regularly throughout the whole intervention period.

Measurements. Glucose and fat metabolism indices were assessed as reported in the main study [2], and maximal oxygen uptake (VO2max) was measured by using an incremental cycle exercise test. For 5 years, the subjects kept an exercise diary and documented all their physical activities with type, intensity and duration. Several exercise indices were calculated both annually and for the whole intervention period. Improvement in glycemic control was evaluated by assessing glycosylated hemoglobin (HbA1c) concentrations and improvement in insulin sensitivity by means of homeostasis model assessments for insulin resistance (HOMA-IR).

Results. From 42 subjects 32 continued exercising until the end of the intervention. Decrease in HbA1c correlated with the exercise frequency during the last two years (r = 0.40, P < 0.05) and with the number of exercise sessions during the whole intervention period (r = 0.39, P < 0.05). Decrease in HOMA-IR did not correlate with exercise frequency, but it correlated with the decrease of body weight during the first 3 years (r = 0.51, P < 0.001). VO2max at the beginning of the study, adjusted for age, gender and weight, correlated with the number of all exercise sessions (r = 0.35, P < 0.05) and the number of resistance exercise sessions at gym (r = 0.40, P < 0.01) during the whole intervention, and also with the exercise frequency during the last two years (r = 0.43, P < 0.01).

Conclusion. Subjects having a better physical fitness at the beginning of the study exercised more frequently and more intensively than the others and thus achieved greater benefits by the exercise training.

References

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