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[Intervention Review]

Exercise or exercise and diet for preventing type 2 diabetes mellitus

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ABSTRACT

Background

The incidence of type 2 diabetes is associated with the 'Westernised lifestyle', mainly in terms of dietary habits and physical activity. Thus an intensive diet and exercise intervention might prevent or delay the appearance of diabetes in persons at high risk.

Objectives

To assess the effects of exercise or exercise and diet for preventing type 2 diabetes mellitus.

Search methods

We searched *The Cochrane Library*, MEDLINE, EMBASE, CINAHL, LILACS, SocioFile, databases of ongoing trials and reference lists of relevant reviews.

Selection criteria

Studies were included if they were randomised controlled trials of exercise and diet interventions of at least six month duration and reported diabetes incidence in people at risk for type 2 diabetes.

Data collection and analysis

Two authors independently assessed trial quality and extracted data. Study authors were contacted to obtain missing data. Data on diabetes incidence and secondary outcomes were analysed by means of random-effects meta-analysis.

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Main results

We included eight trials that had an exercise plus diet (2241 participants) and a standard recommendation arm (2509 participants). Two studies had a diet only (167 participants) and exercise only arm (178 participants). Study duration ranged from one to six years. Overall, exercise plus diet interventions reduced the risk of diabetes compared with standard recommendations (RR 0.63, 95% CI 0.49 to 0.79). This had also favourable effects on weight and body mass index reduction, waist-to-hip ratio and waist circumference. However, statistical heterogeneity was very high for these outcomes. Exercise and diet interventions had a very modest effect on blood lipids. However, this intervention improved systolic and diastolic blood pressure levels (weighted mean difference -4 mmHg, 95% CI -5 to -2 and -2 mmHg, 95% CI -3 to -1, respectively). No statistically significant effects on diabetes incidence were observed when comparing exercise only interventions either with standard recommendations or with diet only interventions. No study reported relevant data on diabetes and cardiovascular related morbidity, mortality and quality of life.

Authors' conclusions

Interventions aimed at increasing exercise combined with diet are able to decrease the incidence of type 2 diabetes mellitus in high risk groups (people with impaired glucose tolerance or the metabolic syndrome). There is a need for studies exploring exercise only interventions and studies exploring the effect of exercise and diet on quality of life, morbidity and mortality, with special focus on cardiovascular outcomes.

PLAIN LANGUAGE SUMMARY

Exercise or exercise and diet for preventing type 2 diabetes mellitus

Type 2 diabetes is mainly characterised by a reduced ability of the hormone insulin to stimulate glucose uptake in body fat and muscles (insulin resistance) combined with insufficient insulin secretion that leads to increased blood glucose levels. It has been shown that weight reduction and an increase in daily energy expenditure decreases insulin resistance. There are some factors that are associated with an increased risk of type 2 diabetes: these are obesity, previous gestational diabetes, hypertension, family history of type 2 diabetes, dyslipidaemia and some ethnic groups are more at risk. Persons with "prediabetes" are also at high risk: they have abnormal blood glucose levels but not in the range of diabetes. Prediabetes often precedes the development of type 2 diabetes. We searched for trials that intended to prevent the development of type 2 diabetes in the above mentioned at risk groups. We assessed the effects of increased physical activity alone or in combination with dietary interventions on diabetes incidence and other outcomes.

We included eight trials with 2241 participants randomised to exercise and diet intervention and 2509 participants to standard recommendation. Furthermore, 178 participants were randomised to an exercise only intervention and 167 participants to a diet only intervention. The duration of the interventions in the trials ranged from one year to six years. Interventions varied between studies but mainly consisted of caloric restriction if the person was overweight, low fat content (especially saturated fat), high carbohydrate content and the increase of fibre intake. Physical activity varied but on average at least 150 minutes each week of brisk walking or other activities such as cycling or jogging were recommended. Interventions were mainly delivered by frequent individual counselling by a physiotherapist, an exercise physiologist and a dietitian. Incidence of diabetes was reduced by 37% (relative risk reduction) with exercise and diet. This had favourable effects on body weight, waist circumference and blood pressure. More evidence is required on effects of exercise alone in the prevention of type 2 diabetes. No study reported relevant data on diabetes and cardiovascular related morbidity, all-cause mortality and quality of life.