Daily fish improved lipid profiles in patients with type II diabetes and moderate exercise prevented the deterioration in glycaemic control


Objective
To determine whether aerobic exercise and dietary fish consumption improve serum lipid concentrations without deterioration of glycaemic control in patients with type II diabetes.

Design
8 week randomised controlled trial (factorial design).

Setting
An outpatient clinic of a hospital in Australia.

Patients
55 non-smoking patients with type II diabetes treated with diet, medication, or both, who had a fasting serum triglyceride concentration > 1.8 mmol/l or high density lipoprotein (HDL) cholesterol concentration < 1.0 mmol/l and body mass index < 36 kg/m². Exclusion criteria were > 1 fish meal per week; use of fish oil supplements, insulin, or medication for lipid disorders; physically active; > 30 ml of alcohol per day; heart, liver, or renal disease; neuropathy; retinopathy; or conditions that limited exercise. 49 patients (mean age 53 y, 76% men) completed the study.

Intervention
All patients received a low fat diet and were allocated to fish or no fish and also to light or moderate exercise. Patients in the fish group were instructed to have 1 fish meal per day (3.6 g/d of omega-3 fatty acids). Exercise training was 3 days per week. Light exercise included stationary bicycling and stretching and flexibility exercises designed for no change in cardiovascular fitness. Moderate exercise was stationary bicycling with an individualised goal of 55—65% of peak oxygen consumption.

Main outcome measures
Change in weight; cardiovascular fitness; and concentrations of triglycerides, serum cholesterol, glycated haemoglobin, and glucose.

Main results
Mean body weight fell in all groups with the greatest weight loss in the moderate exercise groups. The moderate exercise groups had a 12% increase in cardiovascular fitness compared with the light exercise groups (p < 0.001). Fish combined with moderate or light exercise reduced triglyceride concentrations (1.2 mmol/l, p < 0.001) and increased HDL cholesterol (0.08 mmol/l, p = 0.02) compared with the no fish control groups. After adjustment for age, sex, and change in body weight, fish consumption was associated with an increase in glycaated haemoglobin (0.5%, p = 0.05) only with light exercise. Self monitored glucose concentrations increased in the fish and light exercise group (0.57 mmol/l, p < 0.001), but decreased in both moderate exercise groups (0.72 mmol/l for fish consumption, p = 0.001, and 0.52 for no fish consumption, p = 0.001).

Conclusions
Fish consumption and a low fat diet improved lipid profiles and reduced weight, but increased glucose concentrations in patients with type II diabetes. Concomitant moderate exercise prevented the increase in glucose concentrations associated with fish consumption.

Sources of funding: Western Australian Health Promotion Foundation (Healthway); Royal Perth Hospital Medical Research Foundation; National Health and Medical Research Council of Australia.

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Commentary
This study by Dunstan et al is important for nurse practitioners, diabetes educators, and physicians who are involved in the recommendation of treatment for patients with type II diabetes. A low fat diet and a daily fish meal as the source of omega-3 fatty acids (beneficial for lipid control) is combined with moderate aerobic exercise (which alone improves glycaemic control). The exercise intensity in this study is similar to that recommended by the American College of Sports Medicine (50% maximal oxygen uptake for 20 minutes, 3 d/wk). Showing the effect of these combined treatments adds to our understanding of methods to optimise metabolic control of fat and carbohydrate metabolism for individuals with type II diabetes while maintaining glycaemic control.

Key to the application of this research is the combination of a low fat diet, a daily fish meal, and exercise at an intensity sufficient to increase energy expenditure. For some overweight, older patients, however, this intensity of exercise may be more than they can manage. Further research is needed to determine the level of exercise necessary to achieve adequate glycaemic control while implementing these dietary regimens, and caution should be used in advising patients to consume a daily fish meal if they are unable to perform moderate aerobic exercise. For patients with type II diabetes similar to those in this study who are able to tolerate moderate exercise, the clinical management of diabetes should be directed towards programmes supporting these treatments in addition to pharmacological interventions.

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