Benefits of Exercise in Men with Type 2 Diabetes

Wei M, Gibbons LW, Kampert JB, Nichaman MZ, Blair SN. Low cardiorespiratory fitness and physical inactivity as predictors of mortality in men with type 2 diabetes. Ann Intern Med 2000;132:605–11.

Study Overview

Objective. To identify an association between levels of physical fitness and aerobic activity and mortality in men with type 2 diabetes mellitus.

Design. Prospective cohort study.

Setting and participants. Data were derived from the Aerobics Center Longitudinal Study (ACLS) based at the Cooper Clinic in Dallas, TX. The Cooper Clinic specializes in preventive health and has produced substantial data on the benefits of physical fitness and activity. All the patients in the ACLS study are men, more than 92% are white, 75% are college graduates, and most are executives or other professionals and come from middle and upper socioeconomic strata. Patients were self-referred to the clinic or referred by their physicians or employers; the proportions of each group were not reported.

Patients were included if they met American Diabetes Association (ADA) criteria for diabetes (n = 897) or if they gave a history of physician-diagnosed diabetes (n = 370). Patients taking insulin were excluded.

Methods. Physical fitness was measured with a maximal exercise test using a graded treadmill protocol. Patients were classified as low fit, moderately fit, or high fit based on predetermined cut-off points and referenced by age to the entire ACLS cohort, including the nondiabetic patients who were not analyzed for this study. Patients self-reported physical activity by identifying activities in which they had participated in the previous 3 months using an extensive written list. Only baseline measures were used to classify patients.

Multiple exposures that may confound the relationship between fitness/activity and mortality were also measured, including personal and family history of cardiac and vascular disease, age, year of baseline examination, smoking status at baseline, alcohol intake, total cholesterol level, blood pressure (lowest of 3 measurements), fasting glucose, whether diabetes was diagnosed before or during their initial evaluation at the Cooper Clinic, and body mass index.

Main outcome measures. All-cause mortality.

Main results. Researchers followed the cohort for an average of 11.7 years. One hundred eighty patients died during a total of 14,777 person-years. At baseline, 42% of patients fell into the low-fit category, and 50% reported being inactive. The survival curves began to separate 3 to 5 years following the initial examination, with the low-fit cohort taking a steeper descent. Highly significant differences between the fit and unfit cohorts at baseline were body mass index, fasting total cholesterol, fasting glucose, uric acid level, triglyceride level, diastolic and systolic blood pressure, smoking status, and cardiovascular disease. All differences were in the direction expected of an unfit cohort. After controlling for these factors, patients with baseline low fitness had a relative risk of dying of 2.1. Based on self-reported physical activity, baseline inactive patients had a 1.7-fold higher chance of dying. Rough estimates from the survival curves suggest an absolute risk reduction of about 10% from fitness at 12 years; survival among fit patients was approximately 90% and among unfit patients was approximately 80%.

Conclusion

There is a moderately strong association between cardiorespiratory fitness/self-reported physical activity and all-cause mortality in this group of patients with type 2 diabetes.

Commentary

The strength of evidence provided by cohort studies is moderate at best. This study shares problems with similarly good but fairly small prospective cohort studies. Its most significant problem was controlling for potential confounders. While the researchers included several good measures of cardiovascular health and risk factors, they used few variables to measure the severity of diabetes and did not report on comorbid conditions. The latter problem was assuaged by reanalyzing the data, eliminating patients who did not reach a maximal heart rate within 85% of predicted. For diabetes severity, only fasting blood sugars were considered. Another biochemical measure (eg, glycosylated hemoglobin), duration of disease, and amount of diabetes medication could have helped control for this potential confounder. Sequelae of diabetes (neuropathy and retinopathy) that may be linked to severity of disease and likelihood of

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mortality and ability or desire to exercise also should have been controlled for.

Since this study did not ascertain physical fitness or activity prospectively and since individuals tend to exercise less as they age, this study may have underestimated the effect size. Its findings make sense given the substantial physiologic evidence regarding the effects of exercise on metabolism of diabetic and nondiabetic subjects. This study adds to the growing epidemiologic and clinical research on the primary and secondary preventive and therapeutic benefits of exercise for a wide variety of conditions. Exercise most likely provides similar benefits to nonwhite and lower socioeconomic populations, who carry a heavy burden of diabetes, but this remains to be documented.

Applications for Clinical Practice

The ADA has recommended exercise as a key component of diabetes treatment [1]. Given the documented and suspected benefits of exercise, physicians should counsel most of their patients to incorporate exercise (at least 30 minutes on most days of the week) into their lives. Special care must be taken with patients on insulin, particularly if they are striving to achieve tight control.

References

1. Diabetes mellitus and exercise. American Diabetes Association. Diabetes Care 1997;20:1908–12.

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