Walking

The Best Medicine for Diabetes?

TYPE 2 DIABETES MELLITUS has become a pandemic.[1] It affects more than 16 million Americans and 135 million people worldwide. Prevalence of diabetes in adults in the world is estimated to reach 5.4% and the number of adults with diabetes worldwide, to reach 300 million in 2025. Diabetes mellitus is associated with dramatically increased risk of coronary heart disease (CHD) death and total mortality. The excess risk of fatal CHD for those with clinical diabetes for 10 to 15 years is similar to that conferred by a prior CHD.[2,3] The combination of a long duration of diabetes and preexisting CHD is associated with a particularly high risk of fatal CHD and total mortality.

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Physical inactivity is a major cause of type 2 diabetes mellitus, and increasing physical activity level is associated with substantial reduction in the risk of type 2 diabetes. Unfortunately, the majority of Americans do not exercise regularly.[4] Walking is the most popular form of exercise, especially among women and older adults, but less than 25% of the US population walks at least 30 min/d.[5] In epidemiologic studies, brisk walking for at least 30 min/d has been associated with a 30% to 40% reduction in risk of type 2 diabetes mellitus.[6] Clinical trials[7,8] have demonstrated that regular walking or other moderate exercise in conjunction with dietary changes can prevent the majority of type 2 diabetes cases in subjects with impaired glucose tolerance, and that lifestyle modification is far more effective than metformin therapy.

Whether the benefit of regular walking can be extended to patients who already have diabetes is less well studied. In this issue of the ARCHIVES, Gregg et al[9] showed that regular walking (3-4 h/wk or a half hour per day) was associated with an approximately 50% lower risk of cardiovascular and total mortality in a cohort of 2896 adults 18 years and older with diagnosed diabetes mellitus. This cohort was derived from the 1990 and 1991 National Health Interview Survey of a nationally representative sample. The inverse association appears to be robust in multivariate analyses controlling for established coronary risk factors and in subgroup analyses according to age, sex, race, body mass index, diabetes duration, comorbid conditions, and physical limitations. The authors estimated that "1 death per year may be preventable for every 61 people who could be persuaded to walk at least 2 h/wk." The clinical and public health implications of such a finding, if confirmed, are enormous, because the benefits of a moderate amount of walking appear to be even greater than those achieved through current pharmacological means to manage diabetes, including tight blood pressure control,[10] cholesterol lowering by statins,[11,12] and strict glycemic control.[13,14]

Several large prospective cohort studies[15-20] have consistently demonstrated a significantly lower risk of CHD with increasing walking time or distance in largely nondiabetic populations. On average, the risk of CHD is 30% to 40% lower for individuals who walk briskly at least half an hour per day as compared with sedentary individuals. Only one previous study[21] examined the association between walking and cardiovascular events among diabetic patients. In the Nurses' Health Study, diabetic women who spent at least 4 h/wk on moderate/vigorous exercise (including brisk walking) had approximately 40% lower incidence of cardiovascular disease (CVD), including CHD and stroke. The inverse association between energy expenditure from walking and risk of CVD was similar to that for total physical activity and persisted after controlling for body mass index and other covariates.

Although the evidence for overall benefits of walking is overwhelming, the shape of the dose-response relationship and the effects of exercise intensity are not entirely consistent. While several studies found a progressively lower risk of CHD with increasing time spent walking or increasing intensity of exercise, reflected by faster walking pace,[15-17,19] other studies found a threshold effect at a lower or higher level of exercise.[18,20] The study by Gregg et al[9] is of particular interest because the mortality rate was lowest for persons who walked 3 to 4 h/wk; increasing walking time did not confer additional benefit. Also, the protective effects of walking were strongest among those who reported that their walking involved a moderate rather than a large increase in heart rate and breathing rate. However, these data most likely reflect confounding by existing diseases, because the risk reduction for perceived higher intensity of walking was more evident when deaths that occurred during the first 2 years of follow-up were excluded. In the Nurses' Health Study, in which baseline CVD or cancer cases were excluded, the benefits of exercise for diabetic patients exhibited a dose-response relationship and extended to 7 h/wk or more of moderate to vigorous exercise.[21] Also, faster walking pace was associated with a greater reduction in incidence of CVD in diabetic women.

There is a large body of evidence from controlled clinical trials to support the benefits of exercise, including walking, on glycemic control and cardiovascular risk factors among diabetic patients. In a recent meta-analysis,[22] exercise with and without dietary changes resulted in a significant reduction in glycosylated hemoglobin (HbA_{1c}) among patients with type 2 diabetes mellitus (difference between exercise and control groups, approximately –0.7%). The magnitude of HbA_{1c} reduction is close to the difference between conventional and intensive glucose-lowering therapy in the United Kingdom Prospective Diabetes Study. In the latter study, an average difference of 0.9% in HbA_{1c} level achieved by intensive treatment with insulin or sulfonylureas resulted in a 25%

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reduction in microvascular complications.[13] An average difference of 0.6% in HbA_{1c} level in the metformin group vs conventional treatment resulted in a 42% reduction in diabetes-related death and a 35% reduction in all-cause mortality.[14] Thus, better glycemic control achieved by exercise is expected to result in clinically significant reductions in diabetes complications and mortality. Unlike pharmacological treatments, which can cause weight gain and other side effects, exercise such as daily walking reduces percentage of body fat, improves blood lipid levels and insulin sensitivity, and decreases blood pressure among diabetic patients.[23-25] Similar benefits have been observed in nondiabetic populations.[26]

Current guidelines from the Centers for Disease Control and Prevention,[27] the Surgeon General's report,[26] and the National Institutes of Health[28] recommend that Americans accumulate at least 30 minutes of moderate-intensity physical activity (such as brisk walking) on most, preferably all, days of the week. These guidelines are strongly supported by data from the epidemiologic studies and clinical trials discussed herein. However, the recent Institute of Medicine report[29] raises the recommendation to 60 min/d of moderate physical activity. Although longer duration and higher intensity of exercise can confer additional health benefits, 60 min/d is likely to be an unrealistic goal for most sedentary adults, and this change in the recommendation can cause confusion in the general public and discourage sedentary individuals from initiating a moderate change in activity patterns.

In summary, persuasive evidence from epidemiologic studies and clinical trials demonstrates substantial benefits of exercise, especially walking, in the prevention and treatment of type 2 diabetes mellitus. Because walking is accessible, is relatively safe, and can easily be incorporated into a daily routine, it is a form of exercise that is practical and suitable for most individuals, especially women, diabetic patients, and the elderly. For diabetic patients, optimal planning and precautions are needed in any exercise program to minimize exercise-induced hypoglycemia and other complications.[30,31] Because of the high prevalence of underlying ischemic heart disease and the augmented risk of joint-related injuries, adoption of a moderate, rather than vigorous, activity program may be more suitable for diabetic patients. For the vast majority of the population, the benefits of walking are enormous, with little or no harm. So far, walking is probably the "best medicine" for both prevention and treatment of diabetes mellitus.

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