

Erectile Dysfunction: The Role of Lifestyle Modification

Martin Miner, MD

Until recently, erectile dysfunction (ED) was often considered an inevitable part of aging and/or diabetes, cardiovascular disease (CVD), hypertension, or dyslipidemia. But a new paradigm has emerged based on recent clinical findings: ED has been clearly identified as one of the earliest manifestations of atherosclerosis and a marker of systemic vascular disease. In this article, the epidemiology of ED and the effect of lifestyle modifications on the course of ED are discussed.

The Epidemiology of ED

The prevalence of ED varies in different reports. The results of a recent Canadian study conducted among primary care practices suggested a prevalence of nearly 50% overall.¹ Another investigation, conducted in the Netherlands, found a prevalence rate of 16.8% overall.² Bacon et al³, using a population of more than 30,000 health professionals, determined that the ED prevalence among men older than age 50 years was 32%. Despite the range of findings, studies have consistently shown that the prevalence and incidence of ED increases with age.

Prevalence and Age

The nationwide burden of ED among older men is staggering. Researchers with the Massachusetts Male Aging Study (MMAS) conducted an 8.8-year follow-up study of the incidence of ED and its variability by age, socioeconomic status, and medical conditions among men aged 40 to 69 years at study entry. The crude incidence rate was nearly 26 cases per 1,000 man-years. The annual incidence per 1,000 man-years increased with each decade of age and was 12.4, 29.8, and 46.4, for men aged 40 to 49, 50 to 59, and 60 to 69 years,

respectively. The investigators predicted that among men aged 40 to 69 years, nearly 18,000 new cases of ED will emerge among Massachusetts men each year and that nationwide, more than 600,000 men alone experience the onset of ED (incident ED) each year.⁴

The association between age and ED was underscored by the results of an analysis of data from the 2001–2002 National Health and Nutrition Examination Survey

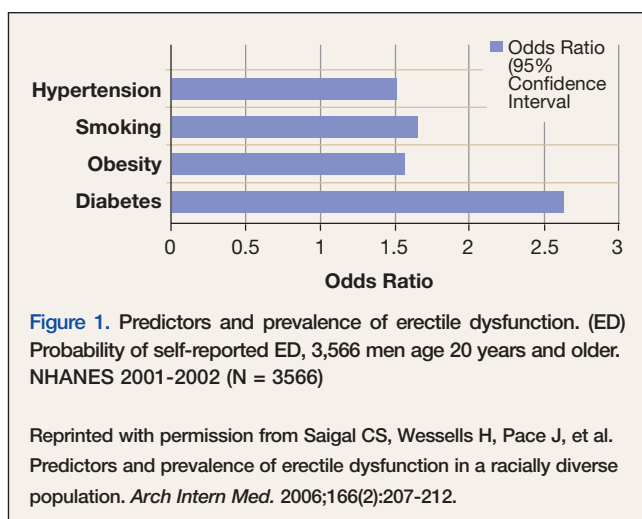
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(NHANES). Data were available for more than 3,500 men aged 20 years and older. The overall prevalence of ED in this group was 20%, but the prevalence in men aged 75 years and older was more than 77%. Erectile dysfunction was 9 times more common among men aged 60 to 69 years than in men in their twenties. The prevalence of ED among Canadian men in primary care practices was assessed by Grover et al.¹ Their survey included a cross-sectional sample of more than 3,900 men, in whom the overall prevalence of ED was more than 49%. The prevalence was higher among men who had CVD or diabetes.¹ This survey also revealed that the prevalence of moderate and severe ED compared to mild ED increases with age, as well.

Other Predictors

Lower urinary tract symptoms (LUTS) and benign prostatic hyperplasia (BPH) have been strongly and significantly associated with ED. In a study conducted

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by Braun et al⁵, 72% of men with LUTS also reported having ED. Among men without LUTS, the prevalence of ED was 38%.⁵

The 2001-2002 NHANES data revealed another striking feature of ED: its independent association with risk factors including diabetes mellitus, obesity, smoking, and hypertension, as shown in Figure 1.⁶ Obesity conferred a 60% increased risk of ED (odds ratio [OR], 1.6). Heart disease, hypertension, and current smoking increased the risk of ED by 44% (OR, 1.44), 56% (OR, 1.56), and 74% (OR, 1.74), respectively. The odds ratio associated with diabetes was 2.69.⁶ The ties between diabetes and ED are discussed elsewhere in this supplement. (See *Erectile Dysfunction in Men with Diabetes Mellitus* on page 8)

Seftel et al⁷, quantified the prevalence of diagnosed hypertension, hyperlipidemia, diabetes, and depression among members of 51 health plans for the period 1995 to 2002. A total of 28 million patients were included, and more than 272,000 men with ED were identified. The investigators found that the crude prevalence rates for hypertension, hyperlipidemia, diabetes, and depression were 41.6%, 42.4%, 20.2%, and 11.1%, respectively. A total of 23.9% had hypertension plus hyperlipidemia, 12.8% had hypertension plus diabetes, and 11.5% had hyperlipidemia and depression. The prevalence of hypertension, hyperlipidemia, and diabetes varied widely according to patient age. Depression was less variable by age. Less than one third of patients with ED (32%) were free of hypertension, hyperlipidemia, diabetes, or depression. The authors concluded that their data supported the notion that ED shares common risk factors with hypertension, diabetes, hyperlipidemia, and depression and that ED should be considered a marker for some or all of them.⁷ In the MMAS, cigarettes smoking increased the risk of ED among men with documented heart disease or with hypertension.⁴

In a health screening project conducted in Vienna

among about 3,000 men aged 46 years and older, men with moderate or severe ED experienced a 65% increase in their Framingham 10-year relative risk of coronary artery disease (CAD) compared with men who did not have ED. The absolute risk was 13.2% versus 8%, a statistically significant difference. Erectile dysfunction increased the risk of stroke by 43%. Mild ED was associated with no increase in CAD risk.⁸

A group of researchers at the University of Chicago Hospitals examined the relationship between ED and atherosclerotic vascular disease in 221 men referred for nuclear stress testing (stress myocardial perfusion single-photon emission computed tomography [MPS]). Nearly 55% of these patients had ED. Those with ED had more severe CAD and left ventricular dysfunction than those without ED. Shorter exercise times and lower Duke treadmill scores were also linked to ED. According to the multivariate analysis, ED was an independent predictor of severe CAD and high-risk findings on MPS.⁹

More recently, Thompson et al¹⁰, prospectively evaluated the association between ED and CVD. The study population included more than 9,400 men randomized to the placebo arm of the Prostate Cancer Prevention Trial. The participants were evaluated at 3-month intervals for both CVD and ED. At the start of the study, 85% of participants were free of CVD, and 47% had ED. Among the 4,247 men who were free of ED at the outset of the study, 57% reported new-onset ED during the study. Transient ischemic attack showed the strongest association with incident or prevalent ED. Angina, myocardial infarction (MI), and stroke all had significant associations with ED ($P < .001$), as well. New-onset ED was associated with a hazard ratio of 1.25 for subsequent CVD, including MI, angina, stroke, and transient ischemic attack, during the follow-up period. When men with incident and prevalent ED were considered together, the hazard ratio increased

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to 1.45. The unadjusted risk of a subsequent cardiovascular event was 0.015 per person-year among men without ED, and 0.24 per person-year among men who reported ED at the start of the study. That is, the risk of CVD among men with ED was nearly twice that of men without ED. The authors noted that ED was

...SMOKING, HYPERTENSION, HYPERLIPIDEMIA, AND DIABETES—ARE ALSO POTENT RISK FACTORS FOR ED.

ranked with current smoking or family history as a predictor of CVD in individuals, as shown in Figure 2. The 7-year estimate of cardiovascular events among men with ED approached 15%. They concluded that a patient's report of ED should prompt a thorough cardiovascular risk assessment.¹⁰ The contribution of Thompson et al¹⁰, is particularly important because it is the first study to document in a prospective fashion among healthy, asymptomatic men the onset of ED and CVD.

In summary, recent research indicates that these familiar CVD risk factors—smoking, hypertension, hyperlipidemia, and diabetes—are also potent risk factors for ED. Endothelial dysfunction, discussed elsewhere in this supplement, is the apparent common denominator.

Modifying Lifestyle, Reducing Risk?

In 2005, the Princeton Consensus Conference guidelines for the treatment of men with sexual dysfunction were updated to reflect the growing evidence that ED and CVD risk are related. The Princeton guidelines recommend that:

- Sexual assessments be conducted in all men who have a cardiovascular evaluation
- All patients who report ED be evaluated for their CVD risk profile
- The importance of lifestyle changes, including weight loss and exercise be emphasized to patients with ED and CVD.¹¹

According to the authors of the second Princeton guidelines, sedentary lifestyle, long recognized as a CVD risk factor, may also be a modifiable risk factor for ED, and one about which patients can be educated. The possibility that ED may improve as physical activity levels increase may be a strong motivator for patients.

Support for encouraging patients to change lifestyle habits was provided by a recent report from the Health Professionals Follow-up Study by Bacon et al.¹² Using mailed questionnaires, they assessed the impact of obesity, physical activity, alcohol use and smoking on the development of ED in 22,086 middle-aged and elderly American men. To be included in the study, men must have reported good or very good erectile function and no major chronic disease before 1986. During the 14-year follow-up, 17.7% of participants reported incident ED. Obesity nearly doubled the risk of ED (multivariate relative risk 1.9 compared to men of ideal weight in 1986), as shown in Figure 3. Smoking increased the risk by about 50% (RR 1.5). Comparing the highest to lowest quintiles of physical activity, men who got the most exercise had a decreased risk of ED (RR 0.7). The

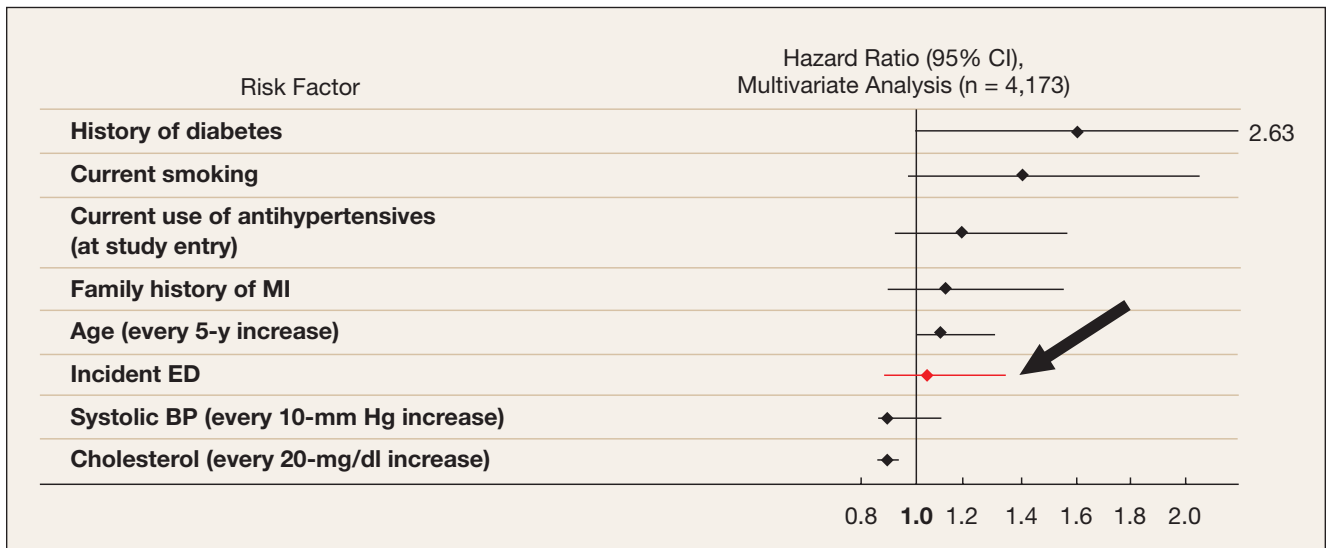


Figure 2. Incident erectile dysfunction had an equal or greater effect on subsequent CV events of same magnitude as traditional risk factors.

CI = confidence interval; MI = myocardial infarction; ED = erectile dysfunction; BP= blood pressure; CV = cardiovascular.

Requested with permission from Thompson IM, Tangen CM, Goodman PJ, Probstfield JL, Moinpour CM, Coltman CA. Erectile dysfunction and subsequent cardiovascular disease. *JAMA*. 2005;294(23):2996-3002.

investigators concluded that the possibility of reducing ED risk would likely be a powerful motivator to get men to increase their physical activity levels, which could, of course, have broader health benefits.¹²

In the MMAS, cigarette smoking was associated with a high probability of complete ED in men with heart disease and hypertension.¹³ Among men who smoked at baseline, the risk of moderate or total ED was almost doubled compared to the risk of ED in men who did not smoke (24% versus 14%, adjusted for age and covariates, $P = .01$)¹⁴ Smoking cessation has numerous health benefits, and the fact that smoking increases the risk of ED may be an important motivator for patients to quit smoking.

In a study of 110 obese men (with a body mass index [BMI] of at least 30), Esposito et al¹⁵, assessed the degree to which weight loss and increased physical activity affected erectile function. Subjects were aged 35 to 55 years and were free of diabetes, hypertension, and hyperlipidemia. All had ED, as indicated by a score no higher than 21 on the International Index of Erectile Function (IIEF) scale. Half of the group (55 men) was randomized to active intervention. They were given plentiful, detailed advice about how to achieve a loss of 10% or more in their total body weight. During monthly group sessions, they were taught how to reduce caloric intake, set goals, and monitor their food intake with food diaries. Each man received direction about the amount of carbohydrate, protein, fiber, and fat to eat,

including types of fat (saturated, monounsaturated, and polyunsaturated). Men in the intervention group were also free to avail themselves of behavioral and psychological counseling. Each participant also received individualized physical activity coaching, including advice on walking, swimming, or participating in games like football or soccer. During the first year, men in the intervention group met with their nutritionists and exercise trainers once a month. During the second year, they met at 2-month intervals. The 55 men in the control group were given generic health information about food and physical activity.

Within 2 years, BMI decreased more among members of the intervention group (from 36.9 to 31.2) than in men in the control group (from 36.4 to 35.7).

IMPROVEMENTS IN BLOOD PRESSURE MAY ALSO IMPROVE ED.

Men in the intervention group were more physically active than those in the control group. Members of the intervention group increased the average time spent exercising from 48 to 195 minutes per week. Those in the control group increased their time spent in physical activity from 51 to 84 minutes per week. Erectile dysfunction improved significantly among men in the intervention group, as demonstrated by an increase in the IIEF score from 13.9 to 17; $P \leq .001$; 17 men in this group had IIEF scores of 22 or higher (Figure 4).¹⁵ No mean change in IIEF scores occurred among men in the control group, although 3 individuals had IIEF scores of at least 22. The results of multivariate analyses showed that improvements in BMI and physical activity were independently associated with improvements in the IIEF score. The investigators concluded that about one third of obese men could expect improvements in erectile function if they lost weight and increased their physical activity levels.

Improvements in blood pressure may also improve ED. While centrally acting sympatholytics, diuretics and beta-blockers may have deleterious effects on erectile function, beneficial effects may be associated with the use of alpha-blockers, ACE inhibitors, and angiotensin receptor blockers. The effects of calcium blockers are believed to be neutral with regard to erectile function.¹⁶

Conclusion

Erectile dysfunction is widely seen as a marker of CVD risk, and the two conditions share many risk

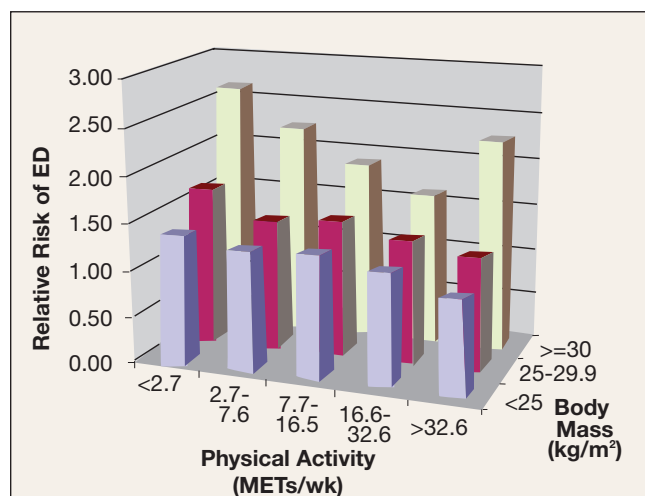
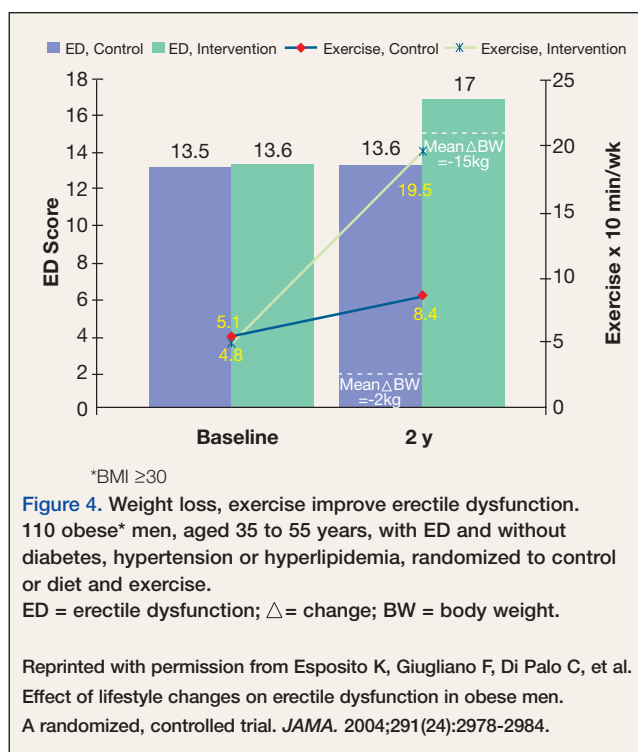


Figure 3. Risk of erectile dysfunction developing by 2000 based on 1986 body mass index and physical activity.

ED = erectile dysfunction; METS = metabolic equivalents of energy expenditure units.

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factors. The Princeton Guidelines recommend a CVD risk assessment for any man who reports ED. One can assume that most men with CVD or CAD have ED, as well. Studies conducted to date suggest that weight loss and an increase in physical activity levels may improve erectile function, and this may be a powerful motivator for patients to make lifestyle changes that improve ED and reduce cardiac risk. Patients should also be made aware that smoking is also a risk factor for ED and that cessation may also help restore erectile function. Control of other risk factors, including blood pressure, may also help, and future studies may shed more light on how the control of other CVD risk factors affects ED.



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