Erectile dysfunction: an overview

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Sexual function is a central part of a man's identity, helping to define who he is, and how he feels about himself. It is also a key determinant of relationship health. Erectile dysfunction (ED) threatens all of this, and is thus an important topic in male health. Erectile dysfunction is common around the world, especially in older men. Risk factors for ED overlap significantly with those for cardiovascular disease and endothelial dysfunction, especially diabetes.

Key Words: erectile dysfunction, risk factors

Introduction

Twenty years ago, erectile dysfunction (ED) did not exist as a diagnostic term. Its former name, impotence, carried a heavy connotation – an impotent man was powerless, worthless, less than a man. Impotence was seldom discussed in the medical literature, and even less often discussed in the locker rooms or bedrooms of the nation. To be impotent was to be ashamed. And to discuss impotence with a physician was often futile, as available treatments were ineffective, difficult, or invasive.

The picture has changed radically. Erectile dysfunction is now the subject of enormous media coverage, with articles, advertisements, and commentary ensuring that ED is a term, and a topic, of widespread discussion. Scientific advances have increased understanding of the pathophysiology of ED, and have led to new therapies for ED that are convenient and often successful.

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This article will examine the role and impact of sexual function in a man's life; the effects of sexual dysfunction, especially ED; and the epidemiology and pathophysiology of ED.

Sexual function

A recent textbook of ED defines sexual function succinctly: "Normal sexual function in males involves libido, initiating and maintaining erection, orgasm, ejaculation, and the refractory period."[1] This however is the narrowest of definitions, a definition that could apply as well to male chimpanzees or rabbits as to male human beings.

Most authors, and most men, embrace a broader definition of sexual function, "…a sexuality in which *people* interact and relate, not just genitals…. The goals of this intimate model of sex are pleasure, closeness, and self- and partner enhancement…"[2] Normal sexual function implies a relationship, in which sex is a component of the interaction between two people. Within the relationship, sex allows for intimacy, an expression of mutual trust, love, caring. At the same

time, in most circumstances, a healthy and enjoyable sexual relationship requires partners who know each other, enjoy their relationship, and show care and concern for each other.[2]

The impact of erectile dysfunction

A sexual interaction between two people can encompass a huge range of sexual activities. Kissing, petting, cuddling, oral sex, anal sex, mutual masturbation, passive or active roles: any or all of these, for many couples, are a part of their sexual range. For most couples, however, intercourse is the central part of their sexual interaction, the main event. Biologically, the primacy of intercourse is related to procreation, but social conditioning and learning is a more likely explanation for the importance of intercourse for most people.[2]

The primacy of intercourse, in turn, explains the crucial impact of erectile function, or dysfunction, on a man, his partner, and his relationship. By definition, an erection is necessary for intercourse, so lack of erection means lack of intercourse, which for many couples means that their sexual lives are incomplete.

Men with ED typically have strong negative feelings about their inability to achieve or maintain an erection. Feelings of shame, anxiety, and terror are reported.[2] Men with ED are often depressed, with performance anxiety, feelings of low self-esteem, and impaired quality of life.[3] A study of men in a urology clinic involved screening for depression with two standardized questionnaires.[4] Men with previous psychiatric illness were excluded. Of 48 men with ED, 54% had depressive symptoms: of 34 men with benign prostatic hyperplasia (the comparison group), only 21% had depressive symptoms ($p < 0.005$).[4]

The partners of men with ED also suffer. In one study of the partners of men seeking help for ED, 49% of female partners felt that their partner was withdrawing as a result of the sexual difficulty; 41% felt that they were to blame for the sexual problem; and 61% felt that their partner was not sexually pleased with them.[5] Women may feel powerless to cure the problem, or may feel unloved, undesirable, or unattractive.[2]

Erectile dysfunction can also be associated with other sexual dysfunctions, such as performance anxiety and premature ejaculation. Even when ED is successfully treated, couples can continue to have trouble (such as anxiety about resuming a sexual life, or discomfort for the female partner), especially if the couple has been asexual for a long time.[6]

Epidemiology of ED

Two major studies from the United States, and one very recent study in Canada, have carefully examined the epidemiology of ED. The three studies have used different methodologies, and examined different patient populations, but give similar results.

The Massachusetts Male Aging Study

The Massachusetts Male Aging Study (MMAS) provides the most comprehensive data available on rates and determinants of ED.[7] A baseline study, conducted between 1987 and 1989, included a random sample of 1290 men 40 to 70 years old from towns and cities near Boston in a cross-sectional, community-based, at-home interview. The overall prevalence of ED (termed impotence in that study) was 52%: the prevalence of complete impotence increased from 5.1% at age 40 years to 15% at age 70 years. Age was the variable most strongly associated with ED. Other factors found to be associated with increased rates of ED included heart disease, hypertension, diabetes, associated medications, and indexes of anger and depression.[7]

A second component of the MMAS included 847 men free of ED in the baseline study, who were followed in 1995 to 1997 (roughly 8 years after the initial study).[8] The overall incidence rate of ED (rate of new cases) was 25.9/1000 men/year. Just as prevalence in the baseline study was related to age, so incidence was found to increase with increasing age Figure 1. The risk of ED developing was found to be higher in men with diabetes, treated hypertension or heart disease, and lower education level.

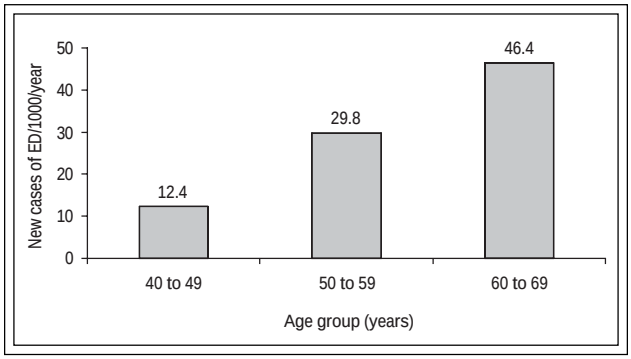

Figure 1. Incidence of ED with age: MMAS, 1998.[8]

The Canadian Male Sexual Health Council Study

In the summer of 2002, the Canadian Male Sexual Health Council (an affiliate of the Canadian Urological Association) published the results of a national telephone survey conducted during spring 2001.[9] A

random sample of Canadian men and women over age 18 years was contacted by predictive dialer technology, with 42% of those contacted agreeing to be interviewed. Subjects were asked about ED only if they had been sexually active in the previous year: 25% of those over age 65 years had not been sexually active, so were excluded.[9]

The prevalence of ED in this sample varied depending on what question was asked, and who responded.[9] When asked if they suffered from ED, 10.4% of men responded positively. However, 22.3% had a score of 21 or lower on the Sexual Health Inventory for Men (SHIM), a score that indicates ED. When women in the survey were asked if their partner had ED, 11.7% responded positively, while 26.7% scored their partner in the ED range of the SHIM. Overall, the authors suggest a prevalence of ED among sexually active men of 27%, with a prevalence for sexually active men over age 45 years of 32.2%.[9]

Men in the Canadian study were also asked about the impact of ED in their lives.[9] Thirty-eight percent of respondents stated that ED put a strain on their relationship, while 36% felt that ED had an impact on their quality of life. Just a quarter of men with ED had discussed their problem with a health professional: of those who had not, only 24% planned to consult a medical professional in the future. However, 80% of men who had not consulted a professional stated that they would be willing to discuss their problem if the professional raised the topic first.[9]

The National Health and Social Life Survey

The National Health and Social Life Survey (NHSLS) was conducted in 1992, using a national probability sample of American citizens living outside of institutions.[10] Eligible subjects were 18 to 59 years of age, and knew English well enough to be interviewed. Interviews were granted by 79% of those asked, so the sample was regarded as representative. Interviews were conducted face-to-face, in private, with an interviewer who matched the subject on various social attributes.[10]

Among the 1244 men surveyed, the most common sexual dysfunction was "climax too early," reported by roughly 30%.[10] The prevalence of ED ("trouble maintaining or achieving an erection") was strongly related to age Figure 2. Other factors associated with increased rates of ED (with adjusted odds ratios) included declining household income (2.11), emotional problems or stress (3.56), low physical satisfaction (4.38), low emotional satisfaction (2.40), low general happiness (2.48), having sexually assaulted a woman (3.52), and having been sexually touched before puberty (3.13). For many of these factors, the reported association does not mean causation: low emotional satisfaction, for instance, might cause ED, or might as easily be the result of ED.

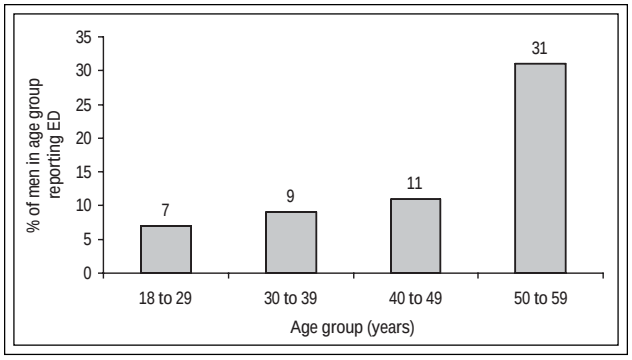

Figure 2. Prevalence of ED with age: NHSLS, 1992.[10]

Risk factors for ED

The studies quoted, and others, have examined risk factors for the development or presence of ED. Table 1 lists the major risk factors that have been confirmed in most studies.[11] Age is the single most important risk factor for ED, even when controlling for other concomitant illness.

Cigarette smoking is a crucial risk factor, as it is one that can be controlled. A cross-sectional study of American veterans aged 31 to 49 found an unadjusted odds ratio for ED of 1.8, comparing never-smokers to current smokers.[12] In the MMAS, the age-adjusted rate of complete impotence among men with treated heart disease was 21% among nonsmokers, but 56% among smokers Figure 3.[7] Another report from the MMAS examined men with no ED at baseline, and no diagnosed diabetes or heart disease at baseline or at follow-up.[13] In these 513 men, cigarette smokers (at baseline) had a rate of moderate or complete ED at follow-up of 24%, compared with 14% among nonsmokers ($p = 0.01$).[13]

TABLE 1. **Major risk factors for ED[11]**

Increasing age
Cigarette smoking
Diabetes
Cardiovascular disease
Other chronic illness
Medications
Surgery and trauma

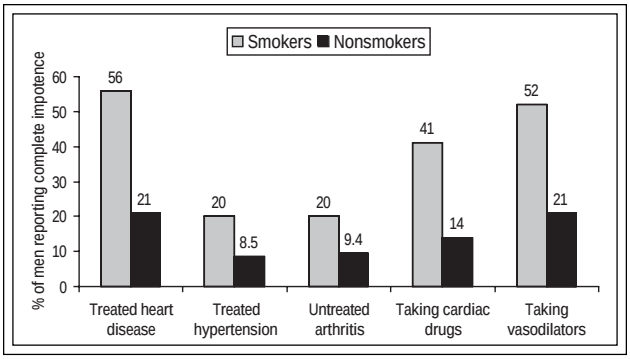

Figure 3. Rates of complete impotence in smokers: MMAS, 1994.[7]

The link between diabetes and ED is strong; diabetics have a risk of ED three times that of the general population, up to 75% of diabetics will have ED at some point.[14] On a pathophysiological basis, the link between ED and diabetes is multifactorial. Neurological dysfunction, vascular compromise, and endothelial dysfunction, are all known to be involved.[15] An inverse relationship between levels of HbA1c and ED exists – poor control of diabetes increases the risk of ED.[15] There is also a direct relationship between the duration of diabetes and (age-standardized) risk of ED Figure 4.[16] In men with ED, undiagnosed diabetes is common, with one Italian study of 107 men with ED finding 5% to have undiagnosed diabetes, and a further 12% to be at risk of developing diabetes on the basis of abnormal fasting glucose (fasting glucose between 5.5 and 6.9 mmol/L).[17]

Cardiovascular disease includes coronary artery disease (angina, myocardial infarction), cerebrovascular disease (TIA, stroke), peripheral vascular disease, and hypertension. The atherosclerotic changes underlying all of these are also evident in the small arteries

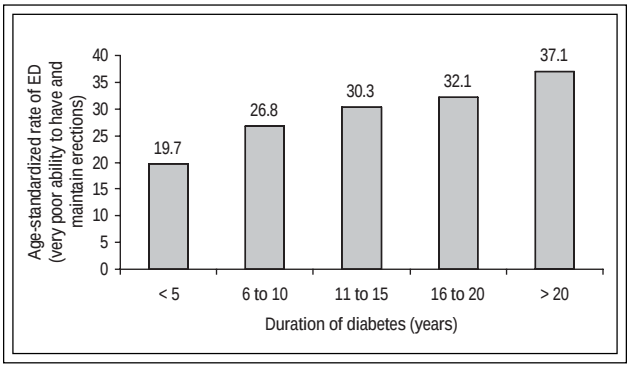

Figure 4. Age-standardized rates of ED in men with diabetes of different durations.[16]

supplying the penis, reducing the blood flow necessary for erection. The link between cardiac disease and ED is discussed further by Dr. Sender Herschorn in his article later in this supplement.

Virtually any chronic disease can increase the rate of ED, through the effects of the illness directly, or indirectly through the anti-erection effects of medications, or through the negative effects of chronic illness on mood and overall feelings of well-being. Chronic illnesses associated with ED include neurologic conditions (MS, Parkinson's disease), chronic renal failure, COPD, liver disease (especially that due to alcohol), and scleroderma (in one report, ED was the presenting symptom of scleroderma in 12% to 21% of patients).[11,18]

The list of medications known to cause ED is long, and lengthening. Up to 25% of men with ED are thought to have medication-related problems.[18] Antihypertensive agents – especially β-blockers and diuretics – are the most commonly associated agents. Psychotropic drugs such as phenothiazines and SSRI antidepressants, hormonal agents such as corticosteroids or antiandrogens, older H2 blockers such as cimetidine, and digoxin, are all associated with a risk of ED.[11,18]

Finally, trauma (whether accidental or surgical) affecting the spinal cord, urogenital tract, or abdominal vasculature can impair erectile function.

Conclusion

Erectile dysfunction deserves to be regarded as a major public health problem. It is certainly common, indeed much more common than many illnesses that occupy front-page headlines. It has a significant impact on the men who suffer with it, an impact that extends far beyond the bedroom. Men with ED are more often depressed and report lower feelings of self-esteem that can affect their productive lives. As well, the partners of men with ED are affected through a loss of intimacy that can lead to significant couple dysfunction. Among the risk factors for ED, age is the most powerful predictor; cardiovascular disease and diabetes are commonly associated; and cigarette smoking is a powerful, and treatable, risk factor. □

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