

The Circle of Lifestyle and Erectile Dysfunction

Michael Kirby, MBBS, LRCP, MRCS, FRCP

The Centre for Research in Primary and Community Care (CRIPACC), University of Hertfordshire, Hatfield, Herts, UK;
The Prostate Centre, London, UK

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ABSTRACT

Introduction. Erectile dysfunction (ED) has been significantly associated with many chronic conditions including obesity, the metabolic syndrome, hypogonadism, diabetes mellitus, cardiovascular disease (CVD), lower urinary tract symptoms, and psychiatric/psychological disorders. ED is also a well-established predictor of CVD.

Aim. This review will focus on the association of ED with cardiovascular, metabolic, and cognitive conditions and discuss the effects of managing lifestyle factors in order to reduce the burden of ED and consequently outcomes in patients with chronic conditions.

Methods. A literature search using Medline, PubMed (U.S. National Library of Medicine and the National Institutes of Health), and abstracts from scientific meetings was performed from 1990.

Main Outcome Measures. Main outcome measures were improvements in sexual function.

Results. A total of 59 reviews on the topic were evaluated.

Conclusions. Targeting several lifestyle factors associated with CVD/metabolic/cognitive disorders, e.g., smoking, alcohol consumption, obesity, and physical activity, can have significant benefits, leading to an improvement in ED as well as testosterone levels and consequently CVD. Kirby M. The circle of lifestyle and erectile dysfunction. *Sex Med Rev* 2015;3:169–182.

Key Words. Erectile Dysfunction; Lifestyle; Cardiovascular

Introduction

Erectile dysfunction (ED) is defined as the inability to attain or maintain a penile erection of sufficient quality to permit satisfactory sexual intercourse. ED affects ~20–50% of men aged 40–70 years [1]. The prevalence is less in younger men. Generally, ED will affect one third of men throughout their lives [2]. Despite the high prevalence, ED is frequently under-recognized and under-diagnosed in clinical practice [3], and opportunities to address adverse risk factors are missed.

ED presents a significant burden to quality of life. Many chronic conditions have been closely associated with ED, including obesity, the metabolic syndrome (METS), hypogonadism, diabetes mellitus (DM), cardiovascular disease (CVD), presence of other genitourinary disease, e.g., lower urinary tract symptoms, and psychiatric/

psychological disorders [4,5]. In an analysis investigating the impact of METS on ED in 107 men, the investigators found that METS could significantly contribute toward ED, suggesting that patients presenting with ED should be evaluated for the presence of METS [6]. CVD, in particular, shares risk factors linked to ED. Most of these conditions are strongly associated with a pro-inflammatory state, resulting in endothelial dysfunction and decrease in the availability and activity of nitric oxide (NO). Decreased vascular NO has been associated with abdominal obesity, smoking, and high intakes of fat and sugar, which all result in oxidative stress, leading to vascular disease [7]. Men with ED have decreased vascular NO as well as circulating and cellular antioxidants, and high levels of superoxide radicals [7]. Aging and poor lifestyle choices are associated with the reduced NO production [7], which in turn may lead to ED [7].

Improving lifestyle habits that modulate the risk factors may have a role in reducing the burden of sexual dysfunction [8]. Targeting several lifestyle factors associated with CVD/metabolic/cognitive disorders, e.g., smoking, alcohol consumption, obesity, and physical activity, can have significant benefits, leading to an improvement in ED as well as testosterone levels [9–14]. Conversely, reducing the burden of sexual dysfunction in men may reduce risk of cardiovascular (CV) events [15]. Phosphodiesterase type 5 inhibitors (PDE5-Is) are licensed for use in idiopathic pulmonary hypertension (sildenafil and tadalafil). In addition, these drugs have shown potential to be of benefit in several other conditions, such as coronary artery disease (CAD) and systolic heart failure [16]. The mechanisms of action through which PDE5-Is probably exert their benefits include pulmonary and systemic vasodilation; increased myocardial contractility; reduced large artery stiffness and wave reflections; improved endothelial function; and reduced apoptosis, fibrosis, and hypertrophy through mechanisms involving NO, cyclic guanosine monophosphate, protein kinase G, and Rho kinase [17]. PDE5-Is have demonstrated reductions in CV morbidity and mortality in diabetic patients with silent CAD and ED in addition to significant reductions in the relative risk CVD incidents among men with ED compared with healthy men [17,18]. This review will focus on the association of ED with CV, metabolic, and cognitive conditions and discuss the effects of managing lifestyle factors in order to reduce the burden of ED and consequently outcomes in patients with chronic conditions.

Chronic Conditions Associated with ED

CVD

ED is common in patients with CVD as well as being an independent risk factor for future CV events in patients with diseases such as diabetes, pre-existing CVD, etc. [2,15,19,20]. Moreover, ED is a predictor of CVD. The symptoms of ED present on average 3–5 years earlier than symptoms of CVD [10,21]. This has been shown in multiple studies. Hodges et al. assessed the temporal relationship between ED and CVD in 207 patients with CVD vs. 165 control subjects [21]. In this study, ED was reported by 66% of individuals with CVD and 37% of the control group, with a mean duration of 5 years for CVD patients and 6.6 years for controls ($P < 0.05$ for both outcomes), suggesting that ED may precede a CV event by as

much as 5 years. Only 53% of the CVD group and 43% of the control group had discussed their symptoms of ED with a healthcare professional and hence their CVD risk was not assessed. Gupta et al. further confirmed that ED is an early marker of CAD in a meta-analysis, demonstrating an average lead time between manifestation of ED and CAD presentation of 2–5 years [1]. Therefore, men with ED should be specifically targeted for CVD preventive strategies including lifestyle changes.

In men less than 40 years of age, conflicting results have been obtained regarding CV risk. In a Brazilian study of men under 40 years of age, ED was not associated with CV risk factors, but it led to negative impact in men's self-esteem, interpersonal relationships, work and leisure activities, and in sexual life satisfaction [22]. However, a more recent study of 965 men in the United States ($\geq$ / $<$ 50 years) investigated the association between change in ED status and Framingham CVD risk, as well as change in Framingham risk. This study demonstrated that after taking into account other CVD risk factors, transient and persistent ED is associated with Framingham CVD risk and a greater increase in Framingham risk over time, particularly in younger men [23]. Inman et al. assessed the association between ED, the long-term risk of CAD, and the role of age as a modifier of this association in 1,402 men without known CAD [24]. The results demonstrated that ED in men aged 40–49 years was associated with a 50-fold risk of CAD [24]. These data suggest that ED and CAD may be differing manifestations of a common underlying vascular pathology. Together, current evidence base supports the need for clinical assessment of CVD risk in men presenting with ED regardless of age.

Early intervention in men with sexual dysfunction, who may be at risk of CV disease, will help prevent future events [15]. Lifestyle modification that targets CVD risk factors may also lead to improvement in ED and vice versa. A systematic review evaluating the effect of lifestyle interventions and pharmacotherapy for CV risk factors on the severity of ED demonstrated that lifestyle modifications and pharmacotherapy were associated with statistically significant improvement in sexual function [1].

Diabetes

ED affects at least 50% of men with DM [25–27]. Hypogonadism is commonly found in men with diabetes, which must be identified and managed to

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