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Sexual dysfunction and the Mediterranean diet

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Abstract

Objectives: To discuss present knowledge about the relation between sexual dysfunction, metabolic factors and the Mediterranean-style diet.
Design: Review of the literature and personal perspectives.
Setting and results: Sexual problems appear to be widespread in society, influenced by both health-related and psychosocial factors, and are associated with impaired quality of life. Epidemiological studies suggest that modifiable health behaviours, including physical activity and leanness, are associated with a reduced risk for erectile dysfunction (ED) among men. Data from other surveys also indicate a higher prevalence of impotence in obese men. Obesity and the metabolic syndrome may be a risk factor for ED. The high prevalence of ED in patients with cardiovascular risk factors suggests that abnormalities of the vasodilator system of penile arteries play an important role in the pathophysiology of ED. We have shown that one-third of obese men with ED can regain their sexual activity after 2 years of adopting health behaviours, including a Mediterranean-style diet associated with regular exercise.
Conclusions: Western societies actually spend a huge part of their health care costs on chronic disease treatment and interventions for risk factors. The adoption of healthy lifestyles can reduce the prevalence of obesity and the metabolic syndrome, and hopefully the burden of sexual dysfunction.

Keywords
Sexual dysfunction
Erectile dysfunction
Obesity
Metabolic syndrome
Mediterranean diet

Erectile dysfunction (ED) is one of the most common chronic disorders affecting more than 100 million men worldwide. Thirty million men in the USA may have ED[1]. Sexual problems appear to be widespread in society, influenced by both health-related and psychosocial factors, and are associated with impaired quality of life. Although many treatment options are available, none of them offers a complete response in all patients. Thus, as with many other medical diseases, prevention may be the most effective approach to alleviating the consequences of sexual dysfunctions. At a time in which obesity and the metabolic syndrome have become a public health crisis, modification of behavioural risk factors is strongly suggested to halt the progression of the epidemic and may also be a safe strategy for the ongoing increased sexual problems in population.

According to a recent CDC report, 64% of Americans (more than 127 000 000) are overweight: out of these, 30% are obese (60 000 000) and 4% are significantly obese[2]. An estimated 325 000 deaths and between 4.3 and 5.7% of direct health costs (approximately 39–52 billion dollars) are attributed to obesity annually. The worldwide prevalence is increasing at such a rapid pace that a WHO consultation on obesity designated obesity as the major unmet public health problem worldwide[3]. The metabolic syndrome (also referred to as syndrome X or insulin resistance syndrome) has emerged as an important cluster of risk factors for atherosclerotic disease. Common features are central (abdominal) obesity, insulin resistance, hypertension and dyslipidaemia (high triglycerides, low high-density lipoprotein cholesterol and small atherogenic low-density lipoprotein particles). Patients with the metabolic syndrome are at increased risk for diabetes and cardiovascular events. The ATP-III guideline[4] also suggests a working definition of the metabolic syndrome that includes the presence of at least three of the following characteristics: abdominal obesity, elevated triglycerides, reduced levels of HDL cholesterol, high blood pressure and high fasting glucose. In particular, the cut-off values are the following: waist circumference >102 cm in men and >88 cm in women, triglycerides $>150\,mg\,dl^{-1}$, HDL cholesterol $<40\,mg\,dl^{-1}$ in men and $<50\,mg\,dl^{-1}$ in women, blood pressure $>130/85$ mmHg and fasting glucose $>110\,mg\,dl^{-1}$. Applying these criteria to the database of the Third National Health and Nutrition Examination Survey (NHANES III), it has been estimated that one out of four adults living in the USA merits the diagnosis[5].

Epidemiological studies suggest that modifiable health behaviours, including physical activity and leanness, are associated with a reduced risk for sexual dysfunction.

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In the Health Professionals Follow-up Study[6], several modifiable lifestyle factors, including physical activity and leanness, were associated with the maintenance of good erectile function. For instance, men with a Body Mass Index (BMI, calculated as weight in kilograms divided by the square of height in meters) higher than 28.7 are likely to carry a 30% higher risk for ED than those with a normal BMI (25 or lower). Data from other surveys also indicate a higher prevalence of impotence in obese men[7,8].

Strong epidemiological evidence links the subsequent risk of ED to the presence of well-recognised risk factors for coronary heart disease, such as smoking, diabetes, hypertension and dyslipidaemia[9–11]. As four of the five components of the metabolic syndrome are risk factors for ED and are also characterised by abnormal endothelial function[12], we postulated an association between the ED and the metabolic syndrome and tested the hypothesis that ED was more prevalent in men with the metabolic syndrome[13]. When compared with age- and weight-matched control subjects ($n = 50$), patients with the metabolic syndrome ($n = 100$) had increased prevalence of ED (26.7 vs. 13%, $P = 0.03$); moreover, there was an increase in ED prevalence (IIEF < 21) as the number of components of the metabolic syndrome increased, suggesting that the cumulative burden of cardiovascular risk may be central to the pathogenesis of ED.

Obesity is an independent risk factor for cardiovascular disease[14], and is associated with elevated levels of several proinflammatory cytokines, as well as the sensitive marker of inflammation C-reactive protein (CRP). Markers of low-grade inflammation are positively associated with endothelial dysfunction in human obesity[15]. We evaluated associations between erectile function, endothelial function and markers of systemic vascular inflammation in 80 obese men, aged 35–55 years, divided into two equal groups according to the presence/absence of ED[16]. When compared with non-obese age-matched men ($n = 50$, BMI $= 24 \pm 1$), obese men (all) had impaired indices of endothelial function and higher circulating concentrations of the proinflammatory cytokines interleukin-6, interleukin-8, interleukin-18 as well as CRP. Endothelial function showed a greater impairment in impotent obese men as compared with potent obese men, while circulating CRP levels were significantly higher in obese men with ED. The association we found between IIEF score and indices of endothelial dysfunction supports the presence of a possible common vascular pathway underlying both conditions in obese men. A defective nitric oxide activity, linked to reduced nitric oxide availability, could provide a unifying explanation for this association. In particular, in isolated corpus cavernosum strips from patients with ED, both neurogenic and endothelium-dependent relaxation is impaired[17].

Obesity and the metabolic syndrome are states of chronic oxidative stress and inflammation[18] which may increase free radical formation that could quench and deactivate nitric oxide, reducing its availability for target cells. Obese men, who are successful in changing their lifestyle experience reduced oxidative stress associated with improved NO availability[19]. Additionally, reduced CRP levels, due to sustained lifestyle changes, may contribute to amelioration of erectile function, as increased CRP levels correlate significantly with reduced NO availability and increasing severity of penile vascular disease as measured by penile Doppler[20].

Erectile and endothelial dysfunctions may have some shared pathways[21], through a defect in nitric oxide activity which may be inhibited through age-, disease- and behaviour-related pathways. Intervention on modifiable health behaviours, especially reducing body weight and increasing physical activity, may in theory be a safe strategy to reduce the risk of both erectile and endothelial dysfunctions. We hypothesised that lifestyle changes aimed at reducing body weight and increasing physical activity would induce amelioration of erectile and endothelial functions in obese men. We conducted a randomised controlled trial involving 110 obese men with ED[22]. Men assigned to the intervention group were entered in an intensive weight loss programme, involving personalised dietary counselling and exercise advice and regular meetings with a nutritionist and personal trainer. The recommended composition of the dietary regimen was the following: carbohydrates 50–60%, proteins 15–20%, total fat <30%, saturated fat <10%, monounsaturated fat 10–15%, polyunsaturated fat 5–8%, fibre 18 g per 1000 kcal. The dietary advice was tailored to each man on the basis of food records collected on three non-consecutive days, which had to be done the week before the meeting with the nutritionist. Men in the control group were given general oral and written information about healthy food choices and exercise at baseline and at subsequent bimonthly visits, but no specific individualised programmes were offered to them. After 2 years, men randomised to the intervention had lost significantly more weight, increased their physical activity, experienced favourable changes in physiologic measures of endothelial dysfunction and had significant improvement in their ED score when compared with men in the control group. Moreover, patients on the intervention diet consumed a greater percentage of calories from complex carbohydrates, protein and monounsaturated fat; had a greater intake of fibre; had a lower ratio of ω-6 to ω-3 fatty acids; and lower energy, saturated fat and cholesterol than had controls. This study provided evidence that sustained lifestyle changes can partially ameliorate erectile function in obese men. In the Massachusetts Male Aging Study, Derby *et al.*[23] found that men who were overweight at baseline were at an increased risk of developing ED regardless of whether they lost weight during the follow-up records. About one-third of obese men with ED regained their sexual activity after 2 years of adopting health behaviours, mainly regular exercise,

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Mediterranean-style diet and reducing weight. This may be in line with epidemiological evidence that physical activity was associated with a 30% lower risk of ED, while obesity was associated with a 30% higher risk of ED. Additionally, men in the intervention programme showed improvement in the number of surrogate traditional and novel cardiovascular risk factors, which were better than those seen in control men.

Obesity and the metabolic syndrome are highly prevalent in the USA population. Thus, a large group of people are at increased risk for developing diabetes and cardiovascular disease. Because endothelial dysfunction may play a role in the pathophysiology of both these conditions and ED, the high prevalence of ED in people with obesity or the metabolic syndrome is of potential concern. Recent results[24] show that dietary factors may be important in the development of ED and claims for the widespread application of current nutritional guidelines, which insists upon increasing consumption of vegetables, fruit, nuts and healthy fats[25], whose intake is less represented in ED patients.

Promotion of healthful lifestyles, including Mediterranean-style diets and exercise, for primary prevention among individuals at all ages yield great benefits and reduce the burden of chronic diseases, and hopefully the burden of sexual dysfunction.

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