

# Mediterranean diet and erectile dysfunction: a current perspective

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**Introduction** In this current perspective we analyzed the role of Mediterranean diet (MedDiet) in sexual function and particularly in erectile dysfunction (ED), according to the latest scientific evidence.

**Material and methods** We conducted a systematic search of relevant full-length papers identified during the time period from 1 January 2010 to the present.

**Results** Published studies showed that adherence to a MedDiet contributes to preventing ED through an improved lipid and glucose metabolism, increased antioxidant defenses, and increased arginine levels which could raise nitric oxide activity.

**Conclusions** Our findings suggest that the encouragement of a healthy lifestyle, such as MedDiet promotion, could be an attractive dietary approach to prevent ED and preserve sexual function.

**Key Words:** Mediterranean diet <> sexual function <> erectile dysfunction <> nitric oxide

## INTRODUCTION

Erectile dysfunction (ED) is defined as "the persistent or recurrent inability to achieve and maintain a penile erection of sufficient rigidity to permit satisfactory sexual activity during a time period of at least 3 months" [1]. It may have endocrine, neurogenic or psychogenic causes, however, the most common origin is vascular, related to reduced penile blood supply. It has been shown that a Mediterranean diet (MedDiet) influences cardiovascular disease risk factors such as metabolic syndrome, hypertension, obesity, and insulin resistance [2–5]. These elements are recognized as precocious indicators of microvascular disease and markers of significantly increased risk of erectile dysfunction (ED).

In this current perspective we will summarize and update, according to the latest scientific evidence, the current role of a MedDiet in sexual function and particularly in ED in men.

## MATERIAL AND METHODS

In this perspective study we critically analyzed the recent literature evaluating the complex relationship between a MedDiet and ED. Papers were identified by Medline, Scopus, Life Science during a time period from 1 January 2010 to the present. Clinical trials were identified using the following keywords: Mediterranean Diet, sexual function, Erectile Dysfunction, Nitric Oxide.

Articles were excluded if the study (a) was not in English, (b) had inappropriate design, (c) did not evaluate a reciprocal relation of MedDiet and ED (e) was presented only as meeting abstracts.

## RESULTS

We have identified 4 clinical trials, from 2010 to the present, on the association between MedDiet and its components with ED (Table 1).

**Table 1.** Summary of Clinical Trials evaluating the relationship between mediterranean Diet and its components with erectile dysfunction

Study	Patient population	Design	Primary endpoint	Results
MEDITA trial (Mediterranean Diet and Type 2 diabetes) [5, 7]	106 male diabetic patients	Single center, randomized, controlled trial	Changes of IIEF after a total follow-up of 8.1 years in MedDiet (n = 54) or a low-fat diet (n = 52, control group).	Reduction in IIEF was significantly greater in the low-fat group compared to MedDiet (p = 0.024).
CAPRI (Campanian post-Prandial hyperglycemia group) [6]	555 male diabetic patients	Large observational study	Prevalence and severity of ED according to MedDiet adherence by tertile of MedDiet score.	ED prevalence and severity in the highest tertile of adherence to MedDiet were significantly lower than in those with low adherence (p 0.01).
Ramirez et al. [9]	440 male non diabetic patients	multicentre, observational, cross-sectional study	Prevalence of ED in a MedDiet cohort (No ED 254 patients, mild ED 109 patients, moderate severe ED 77 patients)	Consumptions of Nuts and vegetables were inversely related to ED
Wang et al. [8]	1466 male diabetic patients	Canadian Community Health Survey (CCHS)	Association between fruit/vegetable consumption and ED among Canadian men with diabetes.	The consumption of fruits and vegetables were inversely associated with ED.

Clinical trials showed that a MedDiet and lifestyle choices influence sexual function in men [5–9]. In particular, a MedDiet with high use of virgin olive oil, vegetables, fruits, moderate wine intake, whole grains, nuts, fibres and fish was associated with lower risk and severity of ED, mainly in type 2 Diabetes Mellitus, with the highest observance to the MedDiet [5, 6, 7]. Newly the MEDITA trial (Mediterranean Diet and Type 2 diabetes), a prospective randomized trial, showed that MedDiet in diabetic patients delayed the deterioration of sexual activity and positively influenced the inflammatory components [5]. Moreover, current studies demonstrated that MedDiet, with a respect to higher lower consumption of nuts and vegetables, was associated with a reduced risk of ED [8, 9]. MedDiet benefits on erectile function might be related to an improved lipid and glucose metabolism, increased antioxidant defenses, and increased arginine levels which could raise nitric oxide activity and thus improve erectile function [8, 10, 11].

Nitric oxide (NO) is generated endogenously from arginine by nitric oxide synthase (NOS) and alternatively from nitrate by xanthine oxidase (XOX). NO acts as a potent opposing modulator on vasoconstriction and is implicated in the balance between vasodilation and vasoconstriction in the endothelium. Decreased NO in vascular ED is determined by decreased NOS activity or by the inactivation of NO [12].

Moreover, the recent PREDIMED (PREvencion con Dieta MEDITerranea) study, a large scale randomized multicenter controlled clinical trial on primary prevention of cardiovascular disease, showed that a MedDiet, particularly supplemented with extra-virgin olive oil, increased plasma antioxidant capacity (extracellular superoxide dismutase and catalase) and reduced XOX activity [13]. Furthermore, in a substudy of PREDIMED, the authors suggested that in a MedDiet, virgin olive oil mainly affects NO bioavailability [14]. Tomatoes, a key component of the Mediterranean diet, are rich in vitamin C, carotenoids (lycopene) and polyphenols (rutin), and also contribute to prevent vascular dysfunction in ED by exhibiting anti-inflammatory properties, improving NO availability, and normalizing aortic vasoconstriction[15].

## CONCLUSIONS

The encouragement of a healthy lifestyle, such as MedDiet promotion, particularly Mediterranean diet vs a low-fat diet, could be an attractive dietary approach to prevent ED and preserve sexual function in men.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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