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ORIGINAL ARTICLE

Association between cardiometabolic index and erectile dysfunction: A new index for predicting cardiovascular disease

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Abstract Over the past decade, it has been suggested that erectile dysfunction (ED) is an early indicator of cardiovascular disease. In a recent study, a new index, termed as cardiometabolic index (CMI), was defined and measured as the product of triglyceride (TG)/high-density lipoprotein-cholesterol (HDL-C) ratio and waist-to-height ratio, which are good predictors of coronary artery disease and main components of metabolic syndrome (MetS). All components of the CMI are also included in MetS criteria. Thus, we decided to evaluate the correlation between CMI, including the criteria of MetS, and ED. A total of 95 men with ED (ED group) and 82 healthy men (control group) were included in the study. Sexual functions were evaluated using the International Index of Erectile Function-5 items scale. CMI was measured as the product of waist-to-height ratio and TG/HDL-C ratio. Mean CMI level was 2.33 ± 0.11 in the study group and 1.14 ± 0.076 in the control group. CMI levels were significantly higher in the ED group ($p < 0.001$). Because of the simplicity of measuring waist circumference, height measurement, and TG and HDL levels, CMI is an easily applicable index for evaluating cardiovascular dysfunction. ED is thought to be a precursor sign for vascular disease and a potential marker for atherosclerosis, endothelial dysfunction, and cardiovascular disease. In this context, CMI can be a useful index for the evaluation and calculation of ED risk, which was used for evaluation of cardiometabolic risk.

Conflicts of interest: All authors declare no conflicts of interest.

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Introduction

Erectile dysfunction (ED) is defined as recurrent or consistent inability to obtain and/or maintain a penile erection sufficient for a satisfactory sexual performance [1]. Although ED is a benign disorder, it may affect physical and psychosocial health and may have a significant impact on the quality of life of both the patients and their partners [2]. The Enhancing Neuro Imaging Genetics through Meta-Analysis Consortium study in 2004 reported that the condition is prevalent in approximately 17% of all European men [3]. The Massachusetts Male Aging Study has shown that 52% of men between the ages of 40 years and 70 years have some degree of ED, and suggested that it had a significant correlation with coronary artery disease (CAD) [4]. Over the past decade, it has been suggested that ED may be an early indicator of cardiovascular disease (CVD) [5]. In light of this association, ED has been described as providing a "window of curability" for men at risk of future CVD. Risk factors and the pathogenic involvement of the nitric oxide (NO) pathway that leads to early impairment of endothelium-dependent vasodilatation and late obstructive vascular changes are similar in ED and other vascular diseases, especially CAD [6–8].

Diabetes, hypertension, hyperlipidemia, and smoking are major risk factors for cardiac diseases and these risk factors directly impact vascular function [9]. Even obesity has been shown to be an independent risk factor for CAD due to the decreased coronary blood flow [10]. A number of studies have shown that these same risk factors also apply to ED [4,11,12]. The main mechanism underlying the pathophysiology of both ED and CVD is the vascular insufficiency such as atherosclerosis and endothelial dysfunction (EnD) [13]. Central obesity is related with a higher risk of both these diseases. Based on this observation, many authors have suggested replacing the body mass index (BMI) with waist circumference (WC) and/or waist-to-height ratio (WHtR) to determine the health risks of obesity and using it as a metabolic syndrome (MetS) screening tool [14,15]. Triglyceride (TG) and high-density lipoprotein-cholesterol (HDL-C) ratio has been suggested to be a good indicator of CVD risk [16,17]. The TG/HDL-C ratio has been shown to reflect the amount of atherogenic, small, dense low-density lipoprotein particles and is associated with insulin resistance and MetS [18].

In a recent study, a new index, termed as the cardiometabolic index (CMI), was defined, and measured as the product of TG/HDL-C ratio and WHtR, which are good predictors of CAD and MetS [19]. All of the components of CMI are included in the MetS criteria. Therefore, we suggested that there could be a correlation between the CMI, including the criteria of MetS, and ED. In this study, we evaluated the effects of CMI values on erectile function.

Materials and methods

This was a prospective, cross-sectional study. We included a total of 95 male patients who consulted to urology polyclinics in Istanbul, Turkey, with complaints of erection problems were included. Before enrollment into the study, all patients were informed in detail about the investigation, and their written consent forms were obtained. Patients who received any treatment for ED or those with genital deformities, psychological disorders, major pelvic surgery, which could be associated with ED, were not included in the study. In addition, 82 healthy men were included in the study (control group). Men in the control group were selected from the patients who were admitted to our polyclinic because of other complaints, such as lower urinary tract symptoms. Data on mean age, comorbidities, BMI, and previous surgeries were recorded for each participant. Exclusion criteria included history of smoking, alcohol and drug abuse (like androgen therapy), trauma or surgery of the pelvis or spine, Peyronie's disease, and depression. We also excluded cases in which the ED originated from factors other than cardiovascular and metabolic conditions.

Sexual functions were evaluated using the International Index of Erectile Function-5 items (IIEF-5) scale. The IIEF-5 scale includes five questions like the 5-point Likert scale. The points ranged from 5 to 25 and a score <21 indicated ED. Participants were classified into the following groups based on their IIEF-5 scale scores: severe ED (5–10), moderate ED (11–15), mild ED (16–20), and no dysfunction (25–21). Cases with IIEF-5 scale scores between 6 and 25 were considered as the ED (+) group, whereas those with IIEF-5 scale scores between 26 and 30 were considered as the ED (−) group.

Serum total and HDL-C and TG levels were measured using an autoanalyzer. BMI was calculated as weight in kilograms divided by the square of height in meters. CMI was measured as the product of WHtR and TG/HDL-C ratio.

Statistical analysis

A two sample *t* test or Mann–Whitney *U* test was used for the continuous variables to compare the characteristics of both groups. All statistical tests were two-tailed, and statistical significance was defined as $p < 0.05$. All analyses were made using SPSS version 15.0 (SPSS Inc., Chicago, IL, USA).

Results

A total of 177 men between the ages of 34 years and 69 years were included in the study. Overall, 95 men had ED and 82 men had no ED. Mean age was 53.5 years (range, 38–69 years) and 53.1 years (range, 34–69 years) in the ED and control groups, respectively. There was no statistical difference between the two groups regarding the mean age. Mean body weight of the patients in the ED and control groups was 78.78 kg (range, 69–105 kg) and 79.42 kg (range, 71–109 kg), respectively. No statistical difference was found for weight and height between the two groups. BMI was 29.11 ± 2.87 kg/m^2 in the study group and 27.27 ± 2.97 kg/m^2 in the control group. BMI was significantly higher in the study group compared with the control group ($p < 0.001$). In the ED group, the HDL-C levels were lower, but the TG levels and WC were significantly higher. The difference was statistically significant for all values. Mean CMI level was 2.33 ± 0.11 in the study group and 1.14 ± 0.076 in the control group (Figure 1). The CMI level was significantly higher in the ED group ($p < 0.001$). Characteristics of all participants are presented in Table 1.