

# Low testosterone may be early marker for type 2 diabetes

[Holmboe SA, et al. \*J Clin Endocrinol Metab.\* 2016;doi:10.1210/jc.2016-1778.](#)

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Low testosterone may be a risk marker for type 2 diabetes but not a risk factor, according to study findings published in *The Journal of Clinical Endocrinology & Metabolism*.

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“Our data do not lend support to management of low total testosterone levels by testosterone supplementation in patients at risk of [type 2 diabetes],” the researchers wrote. “However, low testosterone seems to be an early marker of [type 2 diabetes] risk.”

**Stine Agergaard Holmboe, MSc**, a PhD fellow in the department of growth and reproduction, University of Copenhagen and Rigshospitalet in Denmark, and colleagues evaluated data from four population-based surveys on 5,350 men aged 30 to 70 years examined between 1982 and 2001 and followed until December 2011. Researchers investigated serum levels of total testosterone, [sex hormone-binding globulin](#), free testosterone, estradiol, luteinizing hormone (LH) and follicle-stimulating hormone and the subsequent risk for type 2 diabetes or cardiovascular disease. First diagnosis of type 2 diabetes was used to define [type 2 diabetes outcomes](#), and CV outcomes were defined as first diagnosis of ischemic heart disease or stroke.

After exclusion of men with a diagnosis before baseline, there were 3.9% cases of type 2 diabetes, 12.4% cases of ischemic heart disease and 2.7% cases of stroke through follow-up.

Type 2 diabetes developed in 79 of 2,396 nonsmoking participants and 123 of 2,631 smoking participants. After adjustment for BMI, study, alcohol consumption and exercise, there was a significant adverse trend between age-adjusted testosterone and type 2 diabetes in all participants. Compared with the lowest quartile of SHBG, there was a significantly reduced risk for type 2 diabetes with the highest quartile of SHBG (nonsmokers, HR = 0.3; 95% CI, 0.14-0.63; smokers, HR = 0.4; 95% CI, 0.2-0.78). Compared with participants in the highest quartile of LH/testosterone ratio, those in the lower quartile had a significantly increased risk for type 2 diabetes (nonsmokers, HR = 1.97; 95% CI, 1.03-3.78; smokers, HR = 2.38; 95% CI, 1.34-4.23).

Overall, 256 nonsmokers and 388 smokers developed ischemic heart disease. There was a lower risk for ischemic heart disease among participants in the higher age-standardized SHBG quartile compared with those in the lowest quartile; however, this was only significant for nonsmokers (HR = 0.67; 95% CI, 0.46-0.99). Among smoking men, a link was found between higher levels of free testosterone and a significantly higher risk for ischemic heart disease (HR = 1.37; 95% CI, 1.02-1.85).

“We found that lower levels of testosterone and SHBG, but not LH, were associated with a significantly increased risk of subsequent [type 2 diabetes], suggesting that primary hypogonadism per se is not associated to an increased risk of [type 2 diabetes],” the researchers wrote. “Thus, low testosterone level seems to be a risk marker, but not a risk factor for [type 2 diabetes]. Interestingly, we observed that associations between testosterone and [type 2 diabetes] and CVD differed significantly between smokers and nonsmokers.” – *by Amber Cox*

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