Waist to height ratio is independently associated with chronic kidney disease in overweight type 2 diabetic patients

Kristina Blaslov, Tomislav Bulum, Ingrid Prkačin, Lea Duvnjak
Merkur University Hospital, University of Zagreb, School of Medicine, Zagreb, Croatia

INTRODUCTION

Chronic kidney disease (CKD) i.e. diabetic nephropathy is one of the most serious complications of central obesity-induced type 2 diabetes mellitus (T2DM). Body mass index (BMI), waist circumference (WC), and waist-to-hip ratio (WHR) are traditional tools to detect obesity and higher risk of micro- and macrovascular complications in T2DM. Waist-to-height ratio (WhtR) was also recently reported to be associated with CKD in non diabetic patients. The data from several independent studies suggest that anthropometric measurements that describe central or "android fat" distribution are superior in predicting T2DM than measurements of general obesity. WHtR is proxy for central obesity that corrects WC for height and is supported as an index that can be used in different ethnic, age and sex groups for central obesity screening. The aim of our study to investigate the predictive power of BMI, WC, WHR and WHtR for CKD prevalence in overweight T2DM patients.

SUBJECTS AND METHODS

Study included 125 overweight (BMI≥35 kg/m2) T2DM patients. Basic anthropometric measurements were performed on all study subjects by the same physician. GFR was estimated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) formula. Urine albumin excretion (UAE) was measured from at least two 24-h urine samples. CKD was defined as the presence of impaired eGFR (less than 60 mlmin-11.73m-2) and/or macroalbuminuria (UAE≥300 mg/24h).

RESULTS

Among the 125 type 2 diabetic patients sixty five (52%) were male and 60 (48%) female with median age 58 years and 11 years disease duration. Table 1. summarizes the descriptive anthropometric characteristics and biomedical data as well as CKD prevalence all study participants. The results from ROC analysis shows that AUCs for WHtR was significantly higher than AUC for WC with respect to nephropathy. Moreover the AUCs for other anthropometric parameters suggest that those predictors are not to be considered as validated tests. Optimal cutoffs for WHtR is >0.593 and WC >112 cm. Both tests show high to moderate sensitivity but low specificity. In the logistic regression models of the nephropathy in case of an increase of one SD of the respective anthropometric parameter, WC showed no significance in any of the analysed models while WHtR yielded the significant and great OR in association to nephropathy after adjustment for all confounding risk factors (Table 2).

Table 1: . Baseline characteristics of the study participants

n=125	
Age (years)	58 (31-76)
Disease duration (years)	11 (1-30)
HbA1c (%)	8.63±1.48
Weight (kg)	110 (78-187)
BMI (kg/m^2)	35.57±5.36
Waist circumference (cm)	119 (88-192)
Hip circumference (cm)	116.5(92-165)
Waist to hip ratio	1.005(0.795-1.401)
Waist to height ratio	0.674(0.321-1.091)
Systolic blood pressure (mmHg)	140 (100-220)
Diastolic blood pressure (mmHg)	90 (60-150)
Hypertension, n (%)	114 (91.2)
Total cholesterol (mmol/L)	5.07 (3.02-7.41)
HDL cholesterol (mmol/L)	1.24 (0.70-2.49)
LDL cholesterol (mmHg)	2.95 (1.03-5.81)
Triglycerides (mmol/L)	2.47 (0.76-10.83)
Dyslipidemia , n (%)	93 (74.4)
Serum creatinine (μmol/L)	74 (46-182)
Urinary albumin excretion (mg/24h)	223.29 (2.80-4773.27)
Estimated GFR (mL/min/1.73 m^2)	83 (41-118)
Current smoker, n (%)	105 (84)
Chronic kidney disease prevalence, n(%)	36 (28.8)

Table 2: Odds ratio for nephropathy for one SD increase in weight to height ratio adjusted by other risk factors: gender, age, disease duration, HbA1c, hypertension, dyslipidemia and smoking status

	Crude	Model adjusted for risk factors
Chronic kidney disease prevalence	1.625 (1.103-1.865)	1.697 (1.122-1.895)

DISCUSSION

Central obesity measured with BMI, WC, WHR and WHtR is associated with CKD in diabetic and nondiabetic population. Our study results indicate that WHtR might be of a greater importance as a risk factor in CKD development than other anthropometric parameters that indicate obesity i.e. central obesity and that reliance on those may then underestimate the risk of the disease. Additionally, high sensitivity but low specificity of WHtR in predicting CKD is clearly important because it might give a possibility to identify the disease and could be used as a good screening test but it might in many patients who are disease free being told of the possibility that they have the disease and are then subject to further investigation. Further study evaluation is needed is the WHtR the best anthropometric parameter to precisely assess visceral obesity and association with CKD and whether it might serve as a screening tool.

51ERA-EDTA
188--MP
I) Diabetes. I2) Clinical studies.
Kristina Blaslov
DOI: 10.3252/pso.eu.51era.2014
Poster presented at: 51 ERA-EDTA CONGRESS AMSTERDAM THE NETHERLANDS MAY 31 JUNE 3 2014