

Cut-off values of anthropometry indices to predict cardiovascular disease incidence by ROC curve analysis in 10 years follow-up in study of Yazd healthy heart cohort (YHHC) of Iran

Abdollah Hozhabrnia¹, Sara Jambarsang¹, Seyedeh Mahdieh Namayandeh²

¹ Center for Healthcare Data Modeling, Department of Biostatistics and Epidemiology, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

²Yazd Cardiovascular Research Center; Center for Healthcare Data Modeling, Department of Biostatistics and Epidemiology, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

BACKGROUND/OBJECTIVES: Anthropometric indices are used to estimate obesity, and it seems necessary to determine the best one for appropriate screening of cardiovascular diseases (CVD) risk factors. The current study aimed to determine the optimal cut-off of anthropometric indices for detecting CVD in 10-years study of Yazd Healthy Heart Cohort (YHHC).

METHOD: This study conducted on 2000 participants aged 20-74 years. At cohort baseline, all enrolled individuals without CVD underwent a medical examination. They can succumb to disease during follow-up. Anthropometric indices were measured and calculated at baseline including, body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHpR), waist-to-height ratio (WHtR), body shape index (ABSI), abdominal volume index (AVI), body adiposity index (BAI) and body roundness index (BRI). Coronary artery bypass graft (CABG), percutaneous coronary intervention (PCI), myocardial infarction (MI), Rose Angina Questionnaire (chest pain) greater than 3 and ECG changes in favour of the CAD were considered as the CVD risks. A receiver operating characteristic (ROC) curve analysis was used to evaluate the sensitivity and specificity and the best cut-off of the anthropometric indices for CVD risk.

RESULTS: Overall, 1623 participants, free of CVD at baseline, with mean weight (SD) of 71.21 (12.94) kg were included. During 10 years follow up, 101 CVD event occurred. To identify the anthropometric index that best predicted incidence of CVD, the ROC curves of the anthropometric indices; WC, Hip, BMI, WHpR, WHtR, ABSI, AVI, BAI and BRI were plotted. ROC curve analysis suggested that WHpR was superior to the other indices as it was found to have the largest area under the ROC curve in predicting CVD, AUC: 0.64; Sensitivity: 0.67; Specificity: 0.57. Optimal WHpR cut-off was 0.92.

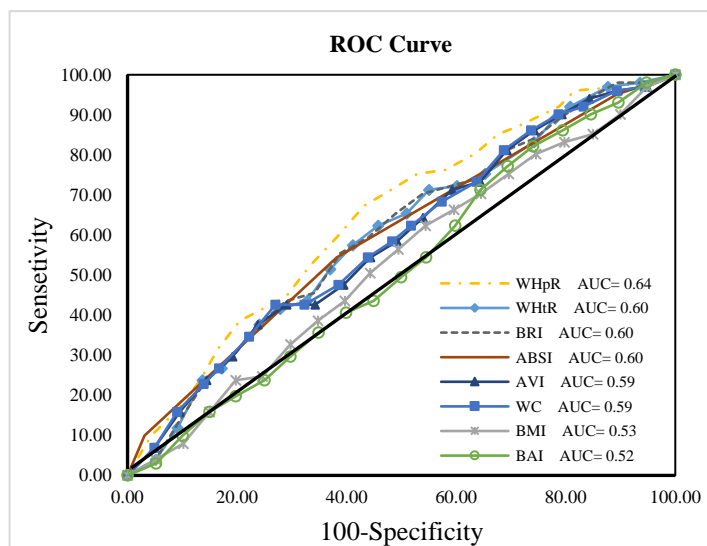


Figure 1: ROC curve for anthropometric indices.

Table 1: Baseline characteristics of study population, CVD-positive group, and CVD-negative group

Characteristics	NO CVD ¹ (n=1522)	CVD ² (n=101)	P-value*
	Mean (SD)	Mean (SD)	
Age (yr)	47.24 (14.74)	61.6 (10.15)	<0.001
Weight (kg)	71.21 (12.95)	71.31 (12.95)	0.939
Height (cm)	165.15 (10.38)	163.83 (9.47)	0.215
WC (cm)	93.45 (12.18)	97.09 (11.58)	0.004
Hip (cm)	102.81 (9.82)	102.53 (9.20)	0.776
BMI	26.15 (4.45)	26.53 (4.13)	0.403
WHpR	0.91 (0.08)	0.95 (0.08)	<0.001
WHtR	0.57 (0.08)	0.59 (0.07)	0.002
ABSI	0.08 (0.007)	0.09 (0.007)	<0.001
AVI	17.87 (4.52)	19.19 (4.34)	0.004
BAI	30.78 (6.41)	31.14 (5.69)	0.578
BRI	4.85 (1.87)	5.39 (1.58)	0.004

Values are mean and standard deviation (SD).

*t-test performed for anthropometric indices.

¹ CVD-negative group: No cardiovascular diseases during 10-years follow-up

² CVD-positive group: With cardiovascular diseases during 10-years follow-up

Table 2: The sensitivity, specificity, AUC, and cut-off of anthropometric indices

indices	Sensitivity	Specificity	AUC	Cut-off	%95 CI AUC	P-value
BMI	0.62	0.46	0.53	25.46	(0.476 , 0.590)	0.25
WC	0.43	0.73	0.59	100	(0.535 , 0.648)	0.001
Hip	0.53	0.46	0.49	101	(0.431 , 0.544)	0.68
WHpR	0.67	0.57	0.64	0.92	(0.592 , 0.698)	0.000
WHtR	0.62	0.54	0.60	0.57	(0.546 , 0.656)	0.0003
ABSI	0.54	0.62	0.60	0.08	(0.568 , 0.679)	0.000
AVI	0.58	0.51	0.59	17.73	(0.532 , 0.645)	0.0021
BAI	0.71	0.36	0.52	27.71	(0.467 , 0.574)	0.45
BRI	0.55	0.61	0.60	5.20	(0.546 , 0.656)	0.0003

CONCLUSION/IMPLICATION: WHpR index which indicated the anatomical and skeletal status of the body was considered as good indicator for predicting the risk of cardiovascular diseases.