The Use of Anthropometric Measures for Cardiometabolic Risk Identification in a Rural African Population

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It has been suggested that the current definitions of obesity may not be appropriate for African populations (1–3). However, few studies of anthropometric indicators of cardiometabolic risk have been conducted within sub-Saharan Africa, where obesity is a rapidly growing problem (4,5). A better understanding of the relationship between adiposity and the risk of cardiometabolic disease in sub-Saharan African populations will be important for the design and implementation of public health care and prevention programs.

This cross-sectional study assessed the ability of anthropometric measures to identify risk of diabetes, hypertension, and dyslipidemia, and considered the optimal cutoff points for BMI and waist circumference (WC) in a rural Ugandan general population, using receiver operating characteristic (ROC) analysis. A total of 6,136 participants, aged ≥18 years, were surveyed, of which 5,518 (57% women) had complete data for analysis. Data were collected using standard procedures. Hypertension was defined as systolic blood pressure (BP) ≥140 mmHg or diastolic BP ≥90 mmHg or reported treatment for raised BP. Dyslipidemia was defined as total cholesterol >5.2 mmol/L and/or triglycerides >1.7 mmol/L. Diabetes was defined as HbA_{1c} ≥6.5% (Diabetes Control and Complications Trial/NGSP units equivalent to ≥48 mmol/mol International Federation of Clinical Chemistry and Laboratory Medicine).

The study population mean BMI was 21.9 kg/m^2 (SD 3.8), mean WC was 77.5 cm (SD 8.6), and mean waist-to-hip ratio (WHR) was 0.8 (SD 0.1). Among men, 6.4% were overweight (BMI 25–29.9 kg/m^2), 0.6% were obese (BMI ≥30 kg/m^2), 20.6% had hypertension, 16.8% had dyslipidemia, and 1.0% had diabetes. Among women, 17.0% were overweight, 5.3% were obese, 20.0% had hypertension, 20.2% had dyslipidemia, and 1.5% had diabetes.

The age-adjusted area under the curve (AUC) for differentiating participants with and without hypertension, diabetes, or dyslipidemia was highest for WC (0.75, 0.83, and 0.70, respectively), followed by BMI (0.74, 0.82, and 0.68, respectively) and then WHR (0.74, 0.78, and 0.66, respectively). AUCs were greater for women than men for all three anthropometric measures. WC performed as well as or better than lipids, BP, and HbA_{1c} at identifying cardiometabolic risk (hypertension, diabetes, or dyslipidemia). Results were broadly similar across age-groups.

The optimal cutoff for WC to identify cardiometabolic risk ranged from ≥78 cm to ≥80 cm for men and ≥82 cm to ≥85 cm for women (Table 1). Optimal cutoffs for BMI ranged from ≥23 kg/m^2 to ≥25 kg/m^2 for men and from ≥24 kg/m^2 to ≥26 kg/m^2 for women. Although broadly similar to the overall cutoff estimates, we observed variation among age-groups.

Replacing the currently recommended WC cutoffs with cutoffs of ≥78 cm for men and ≥82 cm for women would change the prevalence of abdominal obesity from 2.1 to 32.1% in men and from 38.4 to 30.9% in women in this population.

In this rural African population, we found that anthropometric measures, particularly WC, may be useful primary care screening tools for the identification of cardiometabolic risk. However, the currently recommended cutoffs for WC and BMI may not be appropriate for African populations. A systematic assessment of anthropometric measures and cardiometabolic risk across sub-Saharan Africa would help inform cardiometabolic risk evaluation guidelines for African populations and

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M.S.S. and A.K. jointly directed this work.

Table 1—Optimal cutoff values for WC and BMI according to ROC analysis, including sensitivity (S_N) and specificity (S_P) for optimal and standard WC cutoffs

		Men			Women		
		Cutoff	S_N (%)	S_P (%)	Cutoff	S_N (%)	S_P (%)
WC (cm)							
Hypertension	Optimal	≥78	48.04	70.04	≥85	34.02	80.17
	Level 1	≥94	7.01	98.93	≥80	49.68	63.03
	Level 2	≥102	2.47	99.79	≥88	23.73	85.78
Diabetes	Optimal	≥78	79.17	66.78	≥82	72.92	68.13
	Level 1	≥94	29.17	97.98	≥80	72.92	60.97
	Level 2	≥102	16.67	99.48	≥88	47.92	84.36
Dyslipidemia	Optimal	≥80	43.80	81.27	≥82	54.23	73.00
	Level 1	≥94	7.59	98.77	≥80	72.92	61.01
	Level 2	≥102	3.04	99.80	≥88	47.92	84.37
BMI (kg/m^2)							
Hypertension	Optimal	≥24	20.41	87.27	≥26	25.00	82.42
	Level 1	≥25	14.02	92.62	≥25	29.43	75.16
	Level 2	≥30	2.27	99.73	≥30	9.97	94.35
Diabetes	Optimal	≥25	41.67	91.59	≥25	58.33	74.74
	Level 1	≥25	41.67	91.59	≥25	58.33	74.74
	Level 2	≥30	8.33	99.40	≥30	25.00	93.77
Dyslipidemia	Optimal	≥23	36.46	80.30	≥24	49.06	69.52
	Level 1	≥25	20.00	93.52	≥25	39.81	77.79
	Level 2	≥30	2.53	99.69	≥30	13.32	95.21

Levels 1 and 2 refer to standard WC and BMI cutoffs.

enhance population prevention programs.

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