Population Comparison of Two Clinical Approaches to the Metabolic Syndrome

Implications of the new International Diabetes Federation consensus definition

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I n 2005, the International Diabetes Federation (IDF) released a consensus clinical definition of the metabolic syndrome for worldwide use that included central obesity as a prerequisite (1). The IDF definition varied from the earlier Third Report of the U.S. National Cholesterol Education Program Adult Treatment Panel (ATP III) panel definition with broader criteria for waist circumference, HDL, and fasting plasma glucose (2). The impact of these changes to the prevalence of the metabolic syndrome, in particular the use of differing values for defining central obesity, has not been studied. Our aim was to compare these two definitions for the distribution and prevalence of the metabolic syndrome in a representative biomedical population study of predominantly European adults from Adelaide, South Australia (population 1.2 million) (3).

RESEARCH DESIGN AND METHODS — Individuals aged ≥18 years from households selected at random from the electronic white pages directory were eligible. Of the eligible sample of 8,213, a total of 5,850 (71%) completed the initial interview. Of these, 4,060 (69%) attended the clinic for the biomedical examination (3). Respondents completed surveys and underwent clinic assessment, including measurement of blood pressure height, weight, waist, and fasting glucose and lipid levels (3). The study was approved by the institutional ethics committees of the North West Adelaide Health Service, and all subjects gave written informed consent.

Risk factors definitions
Metabolic syndrome. In the IDF definition (1) of the metabolic syndrome, subjects are required to have central obesity (waist circumference ≥94 cm for men and ≥80 cm for women) plus any two of the following: triglyceride level ≥1.7 mmol/l, HDL cholesterol level <0.9 mmol/l in men or <1.1 mmol/l in women, blood pressure of at least 130 mmHg systolic or 85 mmHg diastolic, and fasting glucose level ≥5.6 mmol/l. The ATP III criteria (2) require three or more of the following: triglyceride level ≥1.7 mmol/l, HDL cholesterol level <1.0 mmol/l in men or <1.3 mmol/l in women, blood pressure of at least 130/85 mmHg, fasting glucose level ≥6.1 mmol/l, or waist circumference >102 cm for men or >88 cm for women.
Recreational physical activity. Recreational physical activity was calculated as the number of times activity was undertaken by average time per session by (self-perceived) intensity (4) and categorized as sedentary, low, moderate, and high exercise. High blood pressure was systolic ≥140 mmHg and/or diastolic ≥90 mmHg (5). High cholesterol was total cholesterol of at least 6.21 mmol/l (6). Coronary heart disease was assessed by self-reported myocardial infarction or angina, stroke as self-reported stroke or cerebrovascular event, diabetes as self-reported or clinic determined (fasting blood glucose ≥7.0 mmol/l), and hypertension as self-reported, measured, or on medication.

Statistical analysis
Data were weighted to the 1999 Estimated Residential Population and 2001 Census for South Australia by region, age-group, sex, and probability of selection in the household, in order to provide population-representative estimates (7,8). Data were analyzed with SPSS (version 12.0). Multiple logistic regression models were developed to describe associations with the two metabolic syndrome definitions.

RESULTS — The demographic and anthropometric characteristics of the sample population have been previously described (3,9). The metabolic syndrome was found in 22.8% using the IDF definition (men 26.4%, women 15.7%) and in 15.0% with the ATP III definition (men 19.4%, women 14.4%). Differences between the two approaches increased with age. In those ≥55 years, hypertension was found in 54.5% of men and 53.0% of women. Most people with recorded high blood pressure were not taking medication (601 of 1,092), but of those who were, 66.2% (325 of 491) recorded elevated blood pressure in the clinic.

Table 1 shows the prevalence of metabolic and lifestyle risk factors in men and women according to different categories of waist circumference, as this reflects the main point of difference between the two metabolic syndrome definitions. Diabetes and hypertension were much less common in those without central adiposity.

In multiple regression models, risk of

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Table 1—*Percentage of men and women with metabolic and lifestyle factors and associated vascular diseases, according to age and within different categories of waist circumference*

	Men					Women				
	Age (years)					Age (years)				
	<40	40–54	55–69	≥70	Total	<40	40–54	55–69	≥70	Total
Metabolic syndrome										
IDF definition	11.0	36.5	45.7	35.5	26.4	5.0	20.4	30.7	45.5	19.4
ATP III definition	7.3	21.1	29.5	15.1	15.7	5.0	17.3	23.6	24.8	14.4
CHD or stroke	0.4	2.2	14.9	32.6	6.9	0.0	2.0	7.2	24.9	5.4
Diabetes	1.3	6.1	19.2	15.8	7.2	1.3	4.8	9.1	16.6	5.8
Hypertension	12.5	32.5	49.7	61.5	29.5	5.0	20.3	40.2	68.3	24.4

	Waist circumference (cm)			Waist circumference (cm)		
	≤93	94–101	≥102	≤79	80–87	≥88
n (%)	852 (43.9)	456 (24.5)	680 (31.6)	787 (39.0)	442 (21.3)	842 (40.7)
Metabolic syndrome						
IDF definition	0	33.8	54.6	0.0	16.5	39.2
ATP III definition	1.4	6.7	42.4	0.1	3.4	33.8
Additive lifestyle risk factors*						
Two	16.5	20.8	25.7	15.7	22.0	23.8
Three or more	4.6	6.8	9.7	3.4	4.2	8.5
Lifestyle risk factors						
Smoking	32.4	23.1	23.9	28.3	20.0	15.9
High alcohol	7.5	6.8	7.5	6.8	3.7	3.6
Sedentary	22.8	25.7	29.5	25.5	27.0	37.3
Vascular diseases						
CHD or stroke†	3.2	8.6	10.7	1.6	5.2	9.3
Diabetes	2.7	7.0	12.9	1.4	3.6	11.3
Hypertension	14.2	32.0	46.9	8.3	24.7	39.1

*Current smoking, intermediate to high alcohol consumption, no physical activity (sedentary), high blood pressure (systolic >140 mmHg and/or diastolic >90 mmHg), and total cholesterol of at least 6.21 mmol/l. †Coronary heart disease (CHD) or stroke = self-reported doctor-diagnosed myocardial infarction, angina, or stroke.

the metabolic syndrome tended to increase with age. For the IDF definition, in both men and women, after adjusting for income, education, ethnicity, employment status, government benefit status, and smoking, sedentary behavior was significantly associated with the metabolic syndrome (odds ratio [OR] for men 1.6 [95% CI 1.1–2.4], women 3.8 [1.8–7.9]). In women, lower levels of physical activity were also significantly associated with the metabolic syndrome (OR low 2.3 [1.1–4.8], moderate 2.0 [0.9–4.3]). In men but not in women, lower socioeconomic status, as assessed by lower education levels (OR for graduating high school or less 1.6 [1.1–2.5] or for receiving government benefits 1.8 [1.2–2.4]), was associated with the syndrome. For the ATP III criteria, low and sedentary recreational physical activity was associated in both men and women, with no association with any of the socioeconomic variables.

CONCLUSIONS — This representative urban adult population study has demonstrated a high prevalence of the metabolic syndrome using the new IDF definition. In men aged >40 years and women >70 years, the IDF definition, using a smaller waist circumference, categorized 15–20% more people as having the metabolic syndrome than the ATP III definition. As expected, the prevalence of the metabolic syndrome varies by age-group, economic status, and lifestyle factors such as physical activity and smoking. These findings are similar to previous reports in the literature (10,11).

The cross-sectional nature of the current data precludes causal inferences to be made concerning the relationships or predictive value of either definition for disease states such as diabetes. Also, there was a potential bias from survey nonresponse, although response rates in our sample were higher than comparable biomedical population studies (10,12).

The IDF recommends "aggressive and uncompromising" management of those classified to reduce the risk of cardiovascular disease and diabetes (1). If this definition gains widespread acceptance, then substantially more people will receive management, including drug therapy. Whether the cost in monetary and other terms is justified requires close examination and research. Increasing recognition in the population of risk levels with a simple focus on waist size, along with more vigorous promotion of the value of exercise, are important first steps in addressing metabolic problems.

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