

## The Peculiarities and Challenges of the Metabolic Syndrome in Sub-Saharan Africans

\*Omejua EG, Chukwudebe SN

Most of sub-Saharan Africa is currently undergoing rapid demographic, epidemiologic and socio-economic transformation. Persistent high rates of communicable diseases with escalating incidence and prevalence of non-communicable diseases has been termed "double burden of disease". This scenario signals an impending crisis for the healthcare systems and economies of already resource-constrained countries of Africa.

Metabolic Syndrome (MS) refers to a clustering of multiple metabolic abnormalities in an individual.<sup>1-3</sup> These abnormalities include: high blood pressure, insulin resistance, glucose intolerance, central obesity, low HDL-cholesterol and elevated triglycerides, in various combinations. Individuals with the metabolic syndrome are at increased risk of developing type 2 Diabetes Mellitus (DM) and Cardio-Vascular Disease (CVD) such as stroke and myocardial infarction.<sup>2,4</sup> First described in 1923, by Kylin as the clustering of hypertension, hyperglycemia and gout, the syndrome has been the subject of much academic and clinical discourse and even controversy. Reaven, regarded as the father of the metabolic syndrome named it syndrome X.<sup>5</sup> The other synonyms include: cardio-metabolic syndrome, diabetesity, the deadly quartet, and insulin resistance syndrome, among others.<sup>3,5,6</sup>

There is currently no universally accepted definition of the metabolic syndrome but three out of the several definitions are popular. These are: the World Health Organization (WHO) definition<sup>1</sup>, the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) definition<sup>2</sup>, and recently, the International Diabetes Federation (IDF) definition<sup>3</sup>. None of these definitions is truly adapted to Africans and their peculiar metabolic profile. The IDF definition requires ethnicity-specific central obesity (increased waist circumference) plus any two of the following four parameters: elevated blood pressure, elevated plasma triglycerides, elevated fasting blood glucose and reduced plasma HDL-cholesterol. Its main draw back is that there is no real ethnicity-based waist circumference cut-off point for Africans, rather European values have been recommended for them until specific African values are available.<sup>3</sup> The NCEP ATP III definition is easy to apply in the typical sub-Saharan African setting because of its simplicity but it

appears to be less suitable in predicting the risk of incident Type 2 DM and CVD when compared to the more robust IDF criteria.<sup>4,7</sup> The WHO definition requires sophisticated and delicate measures of insulin resistance which are impracticable in most clinical settings in Africa.

The first report of MS prevalence in the general population in a sub-Saharan African country was by Fezeu and co-workers in Cameroon using the modified IDF, NCEP ATP III and WHO criteria.<sup>7</sup> That study provided the lowest reported population-based prevalence of the MS in the literature at the time of its publication. It recorded rates of MS ranging from 0% to 7.9%, far lower than those reported by workers in developed countries. It was also shown in that study that in sub-Saharan Africans, central obesity was more strongly associated with other components of the MS than insulin resistance was. Another population-based study in Congo Democratic Republic also reported low rates of MS but documented an associated high rate of new-onset type 2 diabetes.<sup>4</sup>

Recently, Ulasi and co-workers in Enugu, South East Nigeria reported higher rates of MS of 18% and 10% in semi-urban and rural populations respectively.<sup>6</sup> Previously, Kelliny and colleagues reported even higher rates in the general population in the Republic of Seychelles (a group of Islands in the Indian Ocean, grouped under the African region).<sup>8</sup> Similarly, Wahab and his colleagues reported a rate of 22% among a small number of apparently healthy Nigerians in Katsina, North West Nigeria.<sup>9</sup> These findings contrast with the low prevalence reported in Cameroon residents by Fezeu and his colleagues and may reflect increasing prevalence.<sup>2</sup> Hypertensive patients, diabetic patients, and other high risk cohorts in various parts of Africa and, indeed, world over understandably have higher rates of MS since they already fulfill at least one condition required for the diagnosis.

The presence of metabolic syndrome in Africans according to the revised NCEP ATP III, IDF (Europe) and IDF (Local Africa) criteria was associated with a 14-fold, 15.6-fold and 16.2-fold higher risk of developing type 2 DM, respectively.<sup>4</sup> This is paradoxical when juxtaposed with the much lower 4- to 6-fold increase in risk among Caucasians despite the tendency of the latter to have higher MS rates.

Another peculiarity of Africans is that they tend to have lower levels of triglycerides and higher HDL-cholesterol, even in the presence of a high overall CVD risk, when compared to Caucasians.<sup>4, 7, 10</sup> This pattern of lipid abnormality has been suggested as being partly

responsible for the relatively low incidence of clinical coronary artery disease among African blacks.<sup>10</sup> On the other hand, the incidence of type 2 diabetes in Africans aged = 40 years is 29 per 1,000 person-years as compared to 2 to 8 per 1,000 person-years seen among Asians and Caucasians (i.e. 2 to 10-fold higher incidence)<sup>4</sup>. It thus seems that type 2 diabetes (and stroke) may be the equivalent of coronary artery disease in Africans.<sup>4</sup>

The relatively high rates of MS in Nigeria and Seychelles suggest a possible higher risk of new-onset type 2 diabetes and CVD compared to even their fellow Africans. This possibility is perplexing and calls for more studies to verify or refute it. Also, the lack of specific ethnicity-based waist circumference cut-off point for Africans, as well as failure to establish the peculiar patterns of lipid abnormalities that are associated with increased CVD risk are major challenges in assessment of metabolic risk in Africans.

The foregoing peculiarities and challenges notwithstanding, there is a clear need to recognize that holistic management of multiple metabolic abnormalities in patients with hypertension, diabetes, obesity, or dyslipidemia, requires insight into the tendencies of these abnormalities to cluster. At a population level, healthy lifestyle measures should be vigorously promoted, while screening for elevated blood pressure, elevated blood glucose, obesity, and plasma lipid abnormalities should be encouraged. If these screenings are done routinely and appropriate interventions instituted promptly, the associated reduction in incidence of type 2 diabetes and CVD (especially stroke) will definitely impact positively on the health and economies of countries of sub-Saharan Africa.

## REFERENCES

1. Alberti KG, Zimmet PZ. Definition, Diagnosis and Classification Of Diabetes Mellitus and its Complications. Part 1: Diagnosis and Classification of Diabetes Mellitus. Provisional Report of WHO consultation. *Diabet. Med.* 1998; 15(7):539-553.
2. Executive Summary: The Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA* 2001; 285: 2486-2497.
3. Alberti KG, Zimmet PZ, Shaw J, et al, for the IDF Epidemiology Task Force Consensus Group. The metabolic syndrome - A New Worldwide Definition. *Lancet* 2005; 366:1059-1062.
4. Longo-Mbenza B, Kasiam Lasi On'kin JB, Nge Okwe A, Kangola kabangu N, Mbungu Fuele S. Metabolic syndrome, Aging, Physical Inactivity, and Incidence of Type 2 Diabetes in General African Population. *Diabetes and Vascular Disease Research* 2010; 7(1): 28-39.
5. Reaven GM. Banting lecture 1988. Role of Insulin Resistance in Human Disease. *Diabetes* 1988; 37 (12): 1595-607.
6. Ulasi II, Ijoma CK, Onodugo OD. A Community-based Study of Hypertension and Cardio-metabolic Syndrome in Semi-Urban and Rural Communities in Nigeria. *BMC Health Services Research* 2010; 10: 71. doi:10.1186/1472-6963-10-71.
7. Fezeu L, Balkau B, Kengne A, Sobngwi E, Mbanya J. Metabolic syndrome in a sub-Saharan African Setting: Central Obesity may be the Key Determinant. *Atherosclerosis* 2007;193(1):70-76.
8. Zoratti R. A Review on Ethnic Differences in Plasma Triglycerides and High-Density-lipoprotein Cholesterol: Is the Lipid Pattern the Key Factor for the Low Coronary Heart Disease Rate in People of African Origin? *Eur J Epidemiol.* 1998; 14: 921.
9. Kelliny C, William J, Riesen W, Paccaud F, Bovet P. Metabolic Syndrome According to Different Definitions in a Rapidly Developing Country of the African Region. *Cardiovascular Diabetology* 2008; 7: 27. doi: 10.1186/1475-2840-7-27.
10. Wahab KW, Sani M, Gbadamosi M, Yandutse M. Frequency and Determinants of the Metabolic Syndrome in Apparently Healthy Adult Nigerians. *Tropical Doctor* 2008; 38: 224-226. doi: 10.1258/td.2007.070352.