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Hypertension-Related Congestive Heart Failure in West Africa: A Framework for Global Blood Pressure Control

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Despite significant advances in patient and healthcare provider education, nonpharmacologic recommendations, and the availability of safe and effective pharmacologic agents, hypertension and target organ damage secondary to the hypertensive process (ie, coronary artery disease, congestive heart failure, renal failure, and stroke) remains a major public health issue and significant cause of morbidity and mortality. While hypertension continues to be a concern in high-income countries, such as the United States, the prevalence of hypertension is markedly increasing in low- and middle-income countries.[1] Thus, hypertension, as a leading cardiovascular disease risk factor, is a global concern affecting approximately 1 billion persons worldwide.[2] To address the increasing importance of hypertension globally and in low- and middle-income countries specifically, Ogah and colleagues report in this issue of the Journal an important and timely prospective observational study of the presentation and outcome of hypertensive heart failure in Nigerian Africans.[3] The data were accrued from the Abeokuta Heart Failure Registry from the south Western Region of Nigeria.

The study is from a single, tertiary care medical center located in an urban city of approximately 1 million people, and the patients were studied for a 2-year period between early 2009 to the end of 2010. During this period, a total of 452 patients were admitted to the medical center with a diagnosis of heart failure (9% of all admissions), of which 355 patients had heart failure secondary to hypertensive heart disease. Of these, 320 patients had complete data available and were included in the study. The diagnosis of heart failure was made and blood pressures were determined by standard criteria that included M-mode and Doppler echocardiography (all read by a single observer) and by mercury sphygmomanometry, respectively. Data from the acute hospitalization were obtained and the patients were followed at periodic intervals for 180 days. Of the 320 patients studied, the mean age was 59 years and there were a greater number of men compared with women (58% vs 42%, respectively). A majority of the patients were married (73%), achieved a primary education (64%), were employed (95%), and lived within the urban catchment area (73%). Interestingly, 85% of the participants had de novo hypertensive heart failure while the remaining 15% had a history of hypertensive heart failure. Approximately, 12% had

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diabetes mellitus. It is interesting, as the authors point out, that the prevalence of comorbidities in the cohort was lower than reported in North America or Europe, while the severity of cardiovascular disease was markedly higher. Corroborative evidence was recently reported from the Prospective Urban and Rural Epidemiological Study (PURE), which demonstrated that among 17 low-, middle-, and high-income countries, countries with low-income status had the lowest risk burden yet substantially higher rates of cardiovascular morbidity and mortality compared with high-income countries.[4]

On presentation, more than 80% of the patients had severe heart failure (New York Heart Association functional class III or IV) with a mean heart rate for the group of 96 beats per minute and systolic and diastolic blood pressure of 143 mm Hg and 91 mm Hg, respectively. Laboratory findings of the group revealed mild elevations of blood urea nitrogen (44 mg/dL) and serum creatinine (1.5 mg/dL), with levels being greater in men than women. Remarkably, 97% of the patients had left ventricular hypertrophy alone and 43% had left ventricular hypertrophy with strain by standard electrocardiographic criteria. Echocardiographic analysis revealed a mean ejection fraction of 42% and significant left ventricular remodeling with left atrial enlargement, increased left ventricular mass, and severe diastolic left ventricular filling characteristics (diastolic dysfunction). The primary diagnosis of systolic dysfunction was made in 66% of the group and diastolic dysfunction was made in 34%. Almost all of the patients were treated with a renin angiotensin inhibitor (angiotensin-converting enzyme inhibitor or receptor blocker) and a diuretic (loop or thiazide), and more than 80% were treated with a mineralocorticoid receptor antagonist (spironolactone). Approximately 30% were treated with a long-acting calcium channel blocker. Importantly, more than 70% of the patients were treated with digitalis (only approximately 10% had atrial fibrillation), which has been shown to potentially increase mortality in this setting, and only 15% and 3% were treated with a hydralazine-isosorbide combination and β-blocker, respectively, which have been shown to decrease mortality in this setting.

Several outcome measures were determined. Among them, the hospital length of stay for the group was 9 days, with an intra-hospital mortality rate of 3.6%. Readmission rates at 30, 90, and 180 days were 4.2%, 5.6%, and 7.3%, respectively, and mortality rates at the same time points were 0.9%, 3.5%, and 11.7%, respectively. As anticipated, patients who died had more severe heart failure, lower systolic and diastolic blood pressures, and higher serum creatinine levels than those who survived. These individuals also had greater left atrial enlargement and more severe indices of left ventricular filling characteristics than those who survived. Additionally, only serum creatinine independently predicted mortality at 180 days.

These data highlight the severe disease burden in Nigeria, particularly related to uncontrolled hypertension as only 9% of persons with hypertension in Nigeria have achieved blood pressure control,[5] and the epidemiologic shift that is taking place in many developing countries with the increasing burden of noncommunicable diseases (NCDs) compared with communicable diseases. NCDs are responsible for almost three quarters of all deaths worldwide.[6] During the past decade, cardiovascular disease has become the single largest cause of death worldwide, representing nearly 30% of all deaths and about 50% of NCD deaths.[7] Hypertension is a leading risk factor for cardiovascular disease and is responsible

for more than 9 million preventable deaths globally each year.[8] The prevalence of hypertension (defined as systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg and/or currently taking hypertension medication) reported among the general adult population in sub-Saharan Africa, based on the most recent representative data from the World Health Organization (WHO) STEPwise approach to Surveillance (STEPS) surveys, ranges from 15.9% to 39.6%. In Nigeria, the prevalence of hypertension is 34.8%.[9] The INTERHEART and INTER-STROKE studies demonstrated that nine modifiable risk factors—including hypertension—account for approximately 90% of the attributable risk for myocardial infarction and stroke in sub-Saharan Africa,[10,11] and that nearly half of all stroke mortality in sub-Saharan Africa is attributed to high blood pressure.[12] A review of hypertension in Nigerian Africans described the prevalence of target organ damage in hypertensive Nigerian patients: left ventricular hypertrophy, 18% to 56%; left ventricular diastolic dysfunction, 62%; left ventricular systolic dysfunction, 18.1%; and arrhythmia, 10%.[12] Stroke prevalence in a community-based study in Lagos was 11.4%, with hypertension present in almost 80% of cases.[5] Many studies that estimate the prevalence of hypertension and its related morbidities from sub-Saharan Africa are limited to small cohorts often from a single clinic. Community-based studies are needed to accurately estimate the true burden of hypertensive disease.

The prevalence of hypertension in sub-Saharan Africa is projected to increase by approximately 68% from 2008 to 2025, representing an estimated 125.5 million persons with hypertension.[13] If we did nothing to address this problem, the economic impact would be substantial, threatening country-level and global development agendas. The cost of illness for cardiovascular disease will increase 22% (US$ 1044 billion) by 2030 if no action is taken.[7] Given these sobering statistics, the WHO Global Monitoring Framework, endorsed at the World Health Assembly in May 2013, included the following global voluntary targets *related* to the prevention and treatment of hypertension: a 25% reduction in the prevalence of raised blood pressure, a 30% reduction in salt intake or a reduction of mean population intake of salt to <5 g/d, and at least 50% of eligible people receiving drug therapy and counselling to prevent heart attacks and strokes, all by 2025.[14]

In recognition of the need for a coordinated response from the global public health community to meet the challenge of improving the control of those with hypertension worldwide, the Centers for Disease Control and Prevention (CDC) in the United States in collaboration with the Pan American Health Organization (PAHO) and other partners launched the Global Standardized Hypertension Treatment Project in 2011, which was recently discussed in this Journal.[15] The broad-scale control of hypertension is challenging yet feasible for all countries across the income spectrum, including in low- and middle-income countries. Successful treatment of hypertension involves the prescription, availability, and adherence to appropriate medications, and sustained long-term monitoring and adjustment of medications. Conditions that impede hypertension control include complex treatment regimens, limited availability and affordability of medications, and healthcare systems that are overburdened and under-resourced.

The Global Standardized Hypertension Treatment Project involves the development and implementation of a framework for standardizing the medical treatment of hypertension and

making these medications more affordable and available.[16] The framework was inspired by successful treatment models for infectious diseases such as those applied in global tuberculosis and HIV management. Central elements include a structured treatment approach with a core set of medications, standardized treatment protocols with targets, and patient cohort monitoring. The project design aims to be feasible and flexible so it can be applied worldwide and complement existing hypertension guidelines. Additionally, a toolkit has been developed and is available online for healthcare providers and clinic administrators who are interested in incorporating the components of Global Standardized Hypertension Treatment Project framework into their clinic infrastructure to enhance the treatment of hypertension (available online at http://www.cdc.gov/globalhealth/ncd/hypertension-tool-kit.htm). The project is currently being implemented in the Latin American and Caribbean region and in PEPFAR-funded HIV care delivery sites in Malawi; however, an additional long-term goal is expansion to other regions.

For the reasons mentioned above, the data reported by Ogah and colleagues contribute significantly to our understanding of the extent of the increasing global cardiovascular disease burden, especially in low- and middle-income countries. In addition, the data highlight areas of potential intervention such as patient and provider education, access to care, evidence-based nonpharmacologic and pharmacologic therapy, and further cardiovascular public health initiatives in low-and middle-income countries globally. We look forward to obtaining more data in this arena and further discussion aimed at global cardiovascular disease prevention and treatment.

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