Hypertension in Minority Populations: New Guidelines and Emerging Concepts

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Persistent disparities in hypertension, CKD, and associated cardiovascular disease have been noted in the United States among racial/ethnic minority groups. Overall, these disparities are largely mediated by social determinants of health. Yet, emerging data suggest additional biologic factors in racial/ethnic disparities in hypertension prevalence, complications, particularly CKD, and responses to treatment. Nevertheless, race is a social construct and not a physiologic concept, and ethnicity, federally defined as the binary "Hispanic/Latino" or "not Hispanic/Latino," is also imprecise. However, race/ethnicity categories may help interpret health-related data, including surveillance and research, and are important in ensuring that clinical trials remain generalizable to diverse populations. There is significant heterogeneity among prespecified groups and, perhaps, greater genetic differences within than between certain racial/ethnic groups. This review will explore hypertension epidemiology, pathophysiology, and management among the diverse and growing US minority groups, specifically African Americans and Hispanics because much less data are available across the wide spectrum of diverse populations. We will highlight the intersection of hypertension and increasingly prevalent CKD, particularly in African Americans. Finally, we propose multidimensional treatment approaches to hypertension among diverse populations, encompassing population, community, health system, and individual-based approaches.

Key Words: Hypertension, Chronic kidney disease, Guidelines, Racial/ethnic minorities, Disparities

Hypertension Epidemiology

Hypertension is the most common risk factor for cardiovascular disease (CVD) affecting nearly 78 million adults in the United States.[1,2] Moreover, this important and modifiable contributor to excess CVD morbidity and mortality affects approximately one-third of US adults,[1] and the prevalence is even higher among African Americans and adults with CKD at 60%.[3] In the most recent National Health and Nutrition Examination Survey data from 2011 to 2012, the prevalence of hypertension was highest among non-Hispanic black adults (42.1%), compared with non-Hispanic white (28.0%), Hispanic (26.0%), and non-Hispanic Asian (24.7%) adults.[4] Furthermore, even mild elevations of systolic blood pressure of 130 mm Hg or more and/or diastolic blood pressure of 85 mm Hg or more pose an increased risk for the development of CVD[5] and CKD, including ESRD.[6-8]

Hypertension-associated adverse cardiovascular events include stroke, coronary heart disease, peripheral vascular disease, myocardial infarction, and heart failure.[9-11] Most adults have hypertension with no identifiable cause, also known as primary or essential hypertension. Secondary or identifiable causes of hypertension include sleep apnea, CKD, medication related (particularly steroids), thyroid disease, pheochromocytoma, primary hyperaldosteronism, and Cushing syndrome. Hypertension is intimately linked with CKD, as both a cause and consequence of CKD,[12] across a continuum, with higher CKD prevalence even among individuals with undiagnosed or prehypertension (Fig 1).[13] It is estimated that approximately 10% of US adults (20 million people) have CKD, with hypertension and diabetes representing the leading causes of ESRD.[14] Furthermore, in nondiabetic hypertensive adults, measurement of cystatin C and the presence of albuminuria may identify 25% cases of occult CKD, otherwise missed by simple creatinine evaluation, most notably among younger African American and Hispanic adults.[15] Therefore, CKD prevalence among hypertensive adults may be underdiagnosed in certain minority populations.[16]

For African Americans, hypertension confers the highest CKD risk among all racial/ethnic groups, with a 4-fold increase in progression to ESRD,[17,18] and Hispanics are approximately 1.5 times as likely to progress to ESRD compared with non-Hispanic whites.[14] Despite decreasing ESRD cases among all groups, disparities persist, particularly among younger African Americans. Additionally, because both African Americans and Hispanics experience significantly longer wait times for kidney transplantation,[19] prevention and early detection of CKD are essential to reduce these disparities and associated health care costs.

Hypertension in Diverse Populations

The burden of hypertension and CKD is not distributed equally.[20] Compared with non-Hispanic whites, African Americans develop hypertension at an earlier age and experience higher rates of stroke and end-stage kidney disease.[10,11,21-24] Rates of hypertension-related ESRD are approximately 4.2 times higher among African Americans.[1] For Hispanic adults, the data have been inconsistent—with some studies showing a higher prevalence of hypertension and others suggesting lower rates compared with non-Hispanic whites.[25,26] Recent data from the

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Hispanic Community Health Study/Study of Latinos estimates an overall prevalence of hypertension of 25% among Hispanics, with the lowest rates among South American women (17.2%) and the highest rates in Dominican men (34.3%).[27] The prevalence of hypertension increases more rapidly with age among Hispanics compared with non-Hispanic whites.[26]

Similarly, less is known about CKD prevalence among Hispanics, with poor representation in large prospective studies and some data suggesting lower overall CKD prevalence but, similar to African Americans, higher rates of microalbuminuria and more rapid disease progression to ESRD compared with non-Hispanic whites.[28-30] In 2 large cohorts of patients with CKD, Hispanics disproportionately had higher rates of diabetes, worse blood pressure control, and were less likely to be on an angiotensin-converting enzyme inhibitor (ACE-I).[31] These participants tended to be of lower socioeconomic status and experience more severe CKD and associated complications compared with their white counterparts.

Among Hispanics, higher acculturation (English language use and increasing years in the United States) has been associated with higher prevalence of self-reported hypertension and CKD.[32-35] Furthermore, there is significant heterogeneity among Hispanics by country of origin, and rates of age-adjusted hypertension are higher among Puerto Ricans and Dominicans compared with Mexican Americans and Cubans.[36] Data from Hispanic Community Health Study/Study of Latinos identify significant heterogeneity in CVD risks and disease prevalence by country of origin, suggesting that previous Hispanic risk factor data, largely obtained from Mexican Americans, may underestimate the true hypertension, CKD, and other cardiometabolic risk factors among certain US Hispanics.[37] Finally, differences in acculturation, health literacy, and social support may partially explain the rapid progression of CKD among Hispanics with hypertension and diabetes.[28]

Among the growing Asian American population, adult hypertension prevalence is estimated at 25.6%, with higher prevalence with age and lower educational attainment level.[38] However, similar to Hispanics, Asians are heterogeneous and subgroup differences among South Asians, Chinese, and Japanese patients should be considered, with possible variation attributed to differences in dietary sodium intake and physical activity patterns. Race-specific data for pharmacologic therapies for hypertension control and CKD prevention are limited for this patient subgroup, other than increased ACE-I-induced cough and possibly angioedema in East Asians.[39]

CLINICAL SUMMARY

- Hypertension is a highly prevalent risk factor for cardiovascular and kidney disease, and disproportionately affects minority populations.
- There are persistent disparities in the prevention and treatment of hypertension among diverse populations, particularly African Americans and Hispanics.
- There are potential genetic and environmental determinants of increased hypertension and kidney disease risk, which may partly explain the observed disparities.
- Prevention of the adverse consequences of hypertension in minority populations should involve population, community, health system, and individually based approaches.

Pathophysiology: Genetic and Environmental Contributors

African Americans

Potential physiologic determinants of increased hypertension and CKD among African Americans, include obesity,[40] low levels of plasma renin,[41] vitamin D deficiency,[42] and sympathetic overactivity.[43] Moreover, in the Jackson Heart Study, isolated nocturnal hypertension in African Americans was shown to correlate with increased left ventricular mass, with a greater tendency toward proteinuria compared with those who were normotensive.[44] Interestingly, polymorphisms encoding apolipoprotein 1 (APOL1) may explain some of the variation in the high rates of nondiabetic kidney disease among African Americans.[45] Recent data from the African American Study of Kidney Disease and Hypertension (AASK) and from the Chronic Renal Insufficiency Cohort (CRIC) help elucidate the role of APOL1 high-risk alleles in kidney disease progression. Interestingly, the progression of CKD by APOL1 status was found to be independent of blood pressure control.

There is a strong association between social determinants of health and hypertension in African Americans. For example, data from the Multiethnic Study of Atherosclerosis cohort showed significant associations between hypertension prevalence and geography, with higher rates of hypertension in the Southern United States.[46] Similarly, recent findings from the Reasons for Geographic and Racial Differences in Stroke cohort demonstrate an association between long-term residence in the southeastern United States with ESRD among African Americans.[47] Geographic disparities may be because of differences in healthy food availability, social cohesion, perceived neighborhood safety, and greater prevalence of cardiovascular risk clustering.

Hispanics

Few studies have specifically explored the pathophysiological basis of hypertension and CKD among Hispanics. However, the Multiethnic Study of Atherosclerosis study demonstrated that left ventricular hypertrophy and adverse LV remodeling was higher among Caribbean-origin Hispanics compared with other Hispanic subgroups, even after controlling for a greater prevalence of hypertension.[48] Similar to African Americans, Hispanics have a higher prevalence of other comorbid diseases, particularly diabetes and cardiorenal metabolic syndrome,[26] are more likely than non-Hispanic whites to have heart failure and ESRD,[49] and are at higher risk of CKD, irrespective of blood pressure.[13] Nevertheless, although Hispanics have been mostly under-represented in landmark hypertension