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Guest Editorial

Hypertension: Where we Stand and the Road Ahead

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Hypertension is the most common risk factor for coronary artery disease, stroke, and chronic kidney disease. Hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke.[1] According to the WHO, the prevalence of raised blood pressure (BP) in Indians was 32.5% (33.2% in men and 31.7% in women). Every third patient is hypertensive. The WHO has proposed a relative reduction in tobacco use by 30%, harmful alcohol intake by 10%, salt consumption by 30%, prevalence of hypertension by 25%, control of cardiovascular disease (CVD) risk factors in at least 50%, and stem the rising tide of obesity and diabetes for decreasing the non-communicable disease (NCD) burden in world.[2] The UN has also adopted the aims for a 33% reduction in NCD mortality by 2030.[3] To achieve these targets, substantial reductions in CVD (accounts for over half of all NCD-related deaths) are mandatory. The most important strategy for reducing CVD mortality is BP control and tobacco smoking cessation. In 25 years period from 1990 to 2015, the prevalence of systolic BP levels of at least 110–115 mmHg rose from 73,000 to 81,000/100,000 population while the prevalence of systolic BP ≥140 mmHg rose from 17,000 to 21,000/100,000. Hypertension led to 4.9 million deaths due to ischemic heart disease, 2.0 million due to hemorrhagic stroke, and 1.5 million due to ischemic stroke in 2015.[4] Dementia is a common problem in elderly estimated the cumulative risk of dementia at 33% for men and 45% for women from age 65 to age 100 years. One of the suspected risk factors for dementia and Alzheimer's disease is hypertension. In mid-adulthood, hypertension was associated with increased risk of dementia.[5,6]

Unfortunately, the implementation of knowledge of hypertension and its treatment and consequences into clinical practice is poor and disappointing. About 50% of population is unaware of their hypertension status. Even in highly developed and affluent countries, satisfactory control of BP amounts to no more than approximately 30% of the diagnosed hypertensive patients, and in other countries, it is even less. In India, awareness of BP in rural and urban India was found to be 25.1% and 41.9%, respectively, while percentage of hypertensive patients having their BP under control in rural and urban India was only 10.7 and 20.2, respectively.[7]

For many decades, observational studies have documented lower risks for cardiovascular outcomes in individuals with lower BP. The prospective studies collaboration reported a continuous and graded relation of systolic and diastolic BP to mortality from coronary heart disease and stroke.[8] Observational data do not always predict the effects of clinical intervention and good randomized trials are required to assess the effect of treatment of hypertension on risk and outcomes for cardiovascular disease. SPRINT trial was a landmark trial that demonstrated clear benefits of the intensive BP lowering strategy.[9] Extrapolated to the general population, it is clear that large numbers of hypertensive individuals could benefit from more aggressive BP lowering.

The dietary approaches to stop hypertension (DASH) eating plan, as studied in the landmark clinical trial, emphasized increased consumption of fruit, vegetables, whole grains, nuts, and low-fat dairy products.[10] The DASH diet has higher protein, fiber, and potassium content, but lower fats and carbohydrates. DASH diet was found to lower systolic and diastolic BP by 5.5 and 3.0 mmHg, respectively.

Despite proven benefits, DASH diet is grossly underutilized. Public health interventions and educational programs can help patients to learn about healthy eating habits that fit within their budgets. The prescription for lifestyle intervention in the management of elevated BP should be emphasized. Effective, individualized nutrition counseling is complicated and time consuming. Therefore, utilizing the services of other professionals such as counselors and dieticians for patients with hypertension can be a good step forward. It is a collective responsibility of health professionals to emphasize healthy lifestyle habits including the DASH eating plan, physical exercise, weight loss, tobacco cessation to our colleagues, and patients.

The increasing prevalence of obesity in children will lead to a tide of young adults with hypertension, diabetes, and

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dyslipidemia who with time will become middle-aged adults at increased risk for cardiovascular disease. This highlights the importance of effective prevention programs to tackle the epidemic of childhood obesity. The consequences of increased body mass index are astounding. It accounted for 4 million deaths worldwide and more than two-thirds of these deaths were due to cardiovascular causes.[11] The widespread application of genome-wide association studies has identified hundreds of genetic variants associated with each of the CVD risk factors and with the occurrence of coronary heart disease.[12] Weight loss in overweight and obese individual should be considered an essential approach to the primary prevention of hypertension, diabetes mellitus, and coronary heart disease and an integral part of treatment for patients with hypertension and other cardiovascular disease risks. Given the ongoing worldwide obesity epidemic, strategies to prevent weight gain throughout the life course must be promoted as a powerful public health approach for the prevention of hypertension, diabetes, and the downstream occurrence of cardiovascular disease.

Relation between sodium intake and BP has been a subject of debate for decades. One of the most convincing trials to date, the DASH diet study, tested sodium restriction on a control diet versus a diet rich in vegetables, fruits, and low-fat dairy products. In the DASH study, sodium restriction from high to intermediate levels reduced systolic BP (SBP) by 2.1 mmHg, while sodium restriction from intermediate to low levels lowered SBP by 4.6 mmHg. The combined effects of the DASH diet and sodium restriction were considerable and resembled those of single-agent drug treatment for hypertension. In participants with hypertension at baseline, the combination of the DASH diet with low sodium levels resulted in 11.5 mmHg lower SBP.[13] Thus, the public health consequences of sodium restriction may be great. In addition to modest antihypertensive effects, sodium restriction favorably impacts the cardiovascular system. In the hypertension genetic epidemiology network study, higher sodium intake (>3.7 g per day) was found to be associated with increased the left atrial and left ventricular dimensions, as well as with two different indices of the left ventricular strain and impaired left ventricular diastolic filling.[14]

In end of 2017, the new antihypertension guidelines were released by ACC/AHA.[15] These have generated considerable debate. These guidelines closely follow the result of SPRINT trial. The most noteworthy feature of the 2017 guidelines is the new classification scheme for elevated BP [Table 1]: Whereas an SBP of 120–139 mmHg or a diastolic pressure of 80–89 was previously classified as prehypertension, these levels of BP are now classified as Stage 1 hypertension. The lowering of the threshold defining hypertension will result in an increase in the proportion of adults with hypertension in the United States from 32% to 46%. Meta-analyses have revealed that CVD risk begins at the SBP threshold of 130 mmHg and the diastolic BP threshold of 80 mmHg.[8,16] The medicosocial implications of restaging hypertension are vast. By applying the new classification, the global prevalence of hypertension in the age group of 20–55 years will instantly escalate by an additional 14% and in the age group of 55–74 years by nearly 10%. The guidelines committee has taken a bold step aimed at decreasing the global burden of CVD by targeting lower BP threshold realizing the fact that even modest elevations in systemic BP >120 mmHg contribute to CVD burden (clinical or subclinical). Another new element introduced into the 2017 guidelines is the incorporation of formal CVD risk assessment into the decision process regarding the level of BP that should trigger pharmacologic intervention. When the 10-year predicted risk of CVD exceeds 10%, initiation of pharmacologic treatment is now recommended for adults with Stage 1 hypertension.[17] As a result, only few elderly patients with Stage 1 hypertension will be untreated due to more aggressive treatment of systolic hypertension in older patients in whom a majority have isolated systolic hypertension. Another feature is the promotion of the use of home-based BP measurement and ambulatory BP measurement and less reliance on office readings. This is important when seen with perspectives of diagnosing white coat hypertension and masked hypertension as well as when labeling a person as hypertensive for the 1st time.

Table 1: Classification of hypertension according to 2017 ACC/AHA guidelines

New classification of hypertension 2017			DBP
BP Category	SBP		
Normal	<120 mmHg	and	<80 mmHg
Elevated	120–129 mmHg	and	<80 mmHg
Hypertension Stage 1	130–139 mmHg	or	80–89 mmHg
Hypertension Stage 2	≥140 mmHg	or	≥90 mmHg

DBP: Diastolic blood pressure, SBP: Systolic blood pressure, BP: Blood pressure

The SPRINT results clearly showed that aggressive lowering of BP is beneficial in all age groups >50 years. However, there is controversy regarding method of BP measurement in the study. The methodology used (automated BP measurement in quiet room without any observer) is impractical in daily practice. To reconcile a SPRINT equivalent office, BP reading is a challenge. It has been postulated that SPRINT BP of <120 mmHg is almost similar to office BP of about 10–15 mmHg higher (130–135 mmHg). Therefore, it can be said that the new guidelines merely "tighten" the prevailing objective for BP goals in the community. The current goals of hypertensive treatment are shown in Table 2. Currently, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, calcium channel blockers, and diuretics are the leading groups of antihypertensive medications. Beta-blockers for control of hypertension have fallen below. Alpha-blockers and agonists like clonidine are to be given on individual need. Specific targets can be achieved by effective monotherapy or sequential combination drug therapy. Patients who were previously treated to goal may now require to add on drugs to their previous therapy to meet new targets, thereby putting some extra burden on patient or health provider's exchequer. The key question is not whether more patients will be treated as a result of widespread adoption of the new guidelines.

Table 2: Current goals of hypertension treatment

Clinical condition (s)	BP threshold, mmHg	BP goal, mmHg
General		
Clinical CVD or 10-year ASCVD risk≥10%	≥130/80	<130/80
No clinical CVD and 10-year ASCVD risk<10%	≥140/90	<130/80
Older persons (≥65 years of age; non-institutionalized, ambulatory, community living adults)	≥130 (SBP)	<130 (SBP)
Specific comorbidities		
Diabetes mellitus	≥130/80	<130/80
Chronic kidney disease	≥130/80	<130/80
Chronic kidney disease after renal transplantation	≥130/80	<130/80
Heart failure	≥130/80	<130/80
Stable ischemic heart disease	≥130/80	<130/80
Secondary stroke prevention	≥140/90	<130/80
Secondary stroke prevention (lacunar)	≥130/80	<130/80
Peripheral arterial disease	≥130/80	<130/80

DBP: Diastolic blood pressure, SBP: Systolic blood pressure, BP: Blood pressure, CVD: Cardiovascular disease, ASCVD: Atherosclerotic cardiovascular disease

Table 3: Classification of hypertension in children

Definitions of normal blood pressure, elevated blood pressure, and hypertension in children and adolescents		
Blood pressure category	Age<13 years	Age≥13 years
Normal blood pressure	BP<90th percentile for age, sex, and height	BP<120≤80 mmHg
Elevated blood pressure	BP reading≥90th percentile and<95th percentile for age, sex, and height	BP 120–129≤80 mmHg
Hypertension	BP≥95th percentile for age, sex, and height	BP≥130/80 mmHg
Stage 1	BP<95th percentile for age, sex, and height to<95th percentile+12 mmHg	BP 130–139/80–89 mmHg
Stage 2	BP≥95th percentile+12 mmHg for age, sex, and height	BP≥140/90 mmHg

Rather, the important point is whether the right patients are being treated. The adoption of new guidelines will reduce the risk of stroke and heart attack for individual high-risk patients while lowering the population burden of CVD, thus proving to be cost-effective in long run by virtue of decreasing long-term morbidity and mortality.

Adult hypertension is a much talked about subject, but the same cannot be said for hypertension in children. Defining hypertension in children and adolescents is a difficult task, much unlike the approach used to define it in adults, in whom extensive population-based data establish levels of BP above which risk increases for hypertension-related CVD events. The classification for hypertension in children is given in Table 3.[18]

To conclude, the prevention and patient education are as important as the diagnosis and treatment. Future programs to increase health literacy and hypertension control can use unique and novel ideas like are likely to use of smartphones, internet linked BP devices, smart pillboxes, and apps to track BP, daily medication use, and encourage adherence with prescribed therapy. Better use of such support systems can make our jobs as health-care providers little easier and our patients more well informed. It is ultimately the population that should benefit from improved BP control.

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