Prehypertension Revisited

Aram V. Chobanian

The Seventh Joint National Committee on the Prevention, Detection, Evaluation and Treatment of Hypertension (JNC-7) introduced the term “prehypertension” to designate individuals whose systolic blood pressure (BP) levels are in the range of 120 to 139 mm Hg and diastolic BP between 80 and 89 mm Hg. The decision to establish this new BP category was based on a number of factors. Several studies had indicated that BP in most societies increases with age, and in Framingham Heart Study participants, ~90% of those whose BP was normal at age 55 years ultimately developed hypertension in their lifetime. Furthermore, in recent observational studies in adults between 40 and 80 years of age, the risk of cardiovascular disease (CVD) increased progressively from levels as low as 115/75 mm Hg upward with a doubling of the incidence of both coronary heart disease and stroke for every 20/10-mm Hg increment of BP. The prehypertension designation was established to focus attention on a segment of the population who were at higher-than-normal CVD risk and in whom therapeutic approaches to prevent or delay the onset of hypertension would be of value.

As part of its deliberations, the JNC-7 considered whether a diagnosis of prehypertension might have a negative influence on an individual’s employment or insurance status or create undue anxieties in some subjects. The committee also discussed whether dealing with large numbers of prehypertensive individuals might place excessive burdens on clinicians who already were having difficulty managing hypertensive patients or might lead to an excessive use of antihypertensive drugs to control prehypertension. However, such concerns were considered to be minor when compared with the potential benefits of dealing more effectively with the growing epidemic of hypertension in the United States.

Many articles have been published on prehypertension since release of the JNC-7 report in 2003. New data have been provided on its rate of progression to hypertension, its prevalence and association with other CVD risk factors, its relationship to the development of CVD, and its therapy.

The rate of progression of prehypertension to hypertension can be relatively rapid, particularly in those whose BP lies in the upper portion of the prehypertension range and in elderly individuals. In Framingham Study participants with BP levels in the 120 to 129/80 to 84 mm Hg range, the BP progressed over 4 years to hypertensive levels in 17.6% of individuals between 30 and 64 years of age and in 25.5% of those ≥65 years of age. In the group with BP levels in the 130 to 139/85 to 89 mm Hg range, the incidence of hypertension was 37.3% and 49.5% for the 30- to 64-year and ≥65-year groups, respectively.

The prevalence of prehypertension in the United States as estimated from the 1999 to 2000 National Health and Nutrition Survey (NHANES) data is ~70 million in the age group of ≥20 years. Surprisingly, many more men (42 million) than women (28 million) have prehypertension. The percentage prevalence of prehypertension in blacks seems roughly similar to that in whites.

Abnormalities in other CVD risk factors are more common in prehypertensive than normotensive individuals. A study of the 1999 to 2000 NHANES data has suggested that 64% of prehypertensive subjects have ≥1 other abnormal CVD risk factor; the percentage increased to 94% in those ≥60 years of age. In a separate investigation, 93% of prehypertensive subjects were reported to have ≥1 other CVD risk factor abnormality. With respect to specific risk factors, the risk ratios for obesity, dyslipidemia, insulin resistance, metabolic syndrome, and diabetes are all greater in prehypertensive than normotensive subjects and are intermediate between those with normotension and hypertension. Microalbuminuria is also more common in prehypertension than normotension as are abnormalities in circulating markers of inflammation, such as C-reactive proteins, interleukin 6, and tumor necrosis factor-α.

Prehypertension is associated with an increased incidence of CVD, particularly in those with BP levels in the 130 to 139/85 to 89 mm Hg range and those with diabetes or glucose intolerance. In a study of 11,116 subjects followed for ~10 years, prehypertensive persons demonstrated a significant increase in the incidence of myocardial infarction but not of stroke as compared with normotensive subjects. In a separate investigation, mortality from CVD was significantly greater in prehypertensive than normotensive individuals, but the differences were no longer present when adjustments were made for the levels of other CVD risk factors.

How best to manage prehypertension has been the subject of recent debate. The JNC-7 report has recommended the adoption of healthy lifestyles to achieve BP goals except in prehypertensive subjects with diabetes or chronic renal disease in whom drug treatment is also advocated. Several studies have demonstrated the efficacy of dietary approaches, alone or in combination with other lifestyle modifications, to...
reduce BP in both prehypertensive and hypertensive persons. The Dietary Approaches to Stop Hypertension (DASH) eating plan, which uses a diet rich in fruits, vegetables, legumes, nuts, and low-fat dietary products and is low in saturated fats, induced a significant lowering of BP, which was reduced even further when dietary sodium was restricted. In the (Optimal Macro-Nutrient Intake)-Heart Study (OMNI) in which the DASH diet was modified to provide more protein and unsaturated fat and less carbohydrate, impressive reductions of BP were also achieved. The PREMIER trial studied the combined effects of diet, physical activity, and weight reduction in 3 groups of prehypertensive and hypertensive subjects over an 18-month period. In the group that received infrequent counseling sessions on modifying their lifestyles, the average reduction in BP was 7.4/5.2 mm Hg. Those who were provided several group and individual counseling sessions exhibited an average decrease of 8.6/7.3 mm Hg. The third group, which differed from the second in that the subjects were also asked to adopt the DASH diet, showed an average BP fall of 9.5/6.2 mm Hg. Although all 3 of the groups demonstrated significant reductions in BP in both prehypertensive and hypertensive subjects, the amount of decrease in the group given relatively minimal counseling was both surprising and gratifying in view of the previous difficulties with obtaining long-term behavioral changes to improve the cardiovascular risk status.

Is there a role for antihypertensive drug treatment in prehypertensive subjects in the absence of diabetes or chronic renal disease? The TROPHY study was a large feasibility study that assessed the effects of the angiotensin receptor blocker candesartan on preventing onset of hypertension in subjects with pretreatment systolic BP in the range of 130 to 139 mm Hg and/or diastolic BP between 85 and 89 mm Hg. Two years of candesartan therapy reduced the incidence of hypertension by approximately two thirds when compared against placebo treatment. However, after cessation of medication, the BP levels in the candesartan group rose more rapidly than in the placebo-treated subjects, and the BP differences narrowed considerably. Two years after withdrawal, 53% of the candesartan group had developed hypertension compared with 63% in the placebo group. Thus, the overall benefit of 2 years of drug therapy to prevent hypertension was minimal. Although most antihypertensive medications are well tolerated and relatively safe, their use to prevent hypertension in a broad segment of the prehypertensive population that might include such individuals as those with concomitant diseases and therapies, pregnant persons, and hypertensive persons, the amount of decrease in the group given relatively minimal counseling was both surprising and gratifying in view of the previous difficulties with obtaining long-term behavioral changes to improve the cardiovascular risk status.

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It has been argued recently that the decision to use antihypertensive drug treatment should be based on global CVD risk rather than on specific levels of BP alone. A practical method of predicting global CVD risk is available from the Framingham Heart Study multivariate risk algorithm, although its applicability to some populations has not been tested. However, whereas using overall CVD risk to guide antihypertensive drug therapy is appealing, in my opinion, adequate clinical trial data are not available as yet to justify such an approach in contrast to the extensive evidence regarding specific BP levels. The importance of this issue warrants early initiation of appropriate clinical trials to examine the problem, although such studies will require large numbers of prehypertensive individuals and will be costly.

The JNC-7 classification and definition of hypertension has been criticized by a hypertension working group that was originally organized by the leadership of the American Society of Hypertension. The working group has proposed a new scheme that includes consideration of the status of “functional and structural cardiac and vascular abnormalities that damage the heart, kidney, brain, vasculature and other organs and lead to premature morbidity and death.” The proposed classification is complex, and the criteria are poorly defined. In addition, some of the studies required to determine early evidence of organ abnormalities can be costly and may not be readily available to many clinicians. Although the working group proposal can serve as a subject of debate between hypertension specialists, it has little or no practical value for guiding clinicians in the management of either hypertension or prehypertension.

Although the treatment of hypertension has played an important role in reducing cardiovascular mortality and morbidity, BP remains inadequately controlled in roughly two thirds of hypertensive individuals in the United States. The prevalence of hypertension has increased from 50 to 65 million in the past decade. With the increase in average age of the population and the rising epidemic of obesity, these numbers will increase even further unless efforts are intensified not only to improve drug therapy but also to expand programs that promote healthier lifestyles that can prevent or delay the onset of hypertension. The current skepticism about the usefulness of nondrug approaches needs to be overcome. Abundant evidence exists that measures such as increase in physical activity and modification of diet as described previously will favorably influence not only BP but also dyslipidemias, obesity, and diabetes.

Incorporation of healthier lifestyles into everyday life has been difficult and to be effective on a broad basis will require a system-wide approach to achieve substantial improvement. Public health groups, employers, insurers, managed care organizations, community groups, media outlets, and schools need to become more involved to facilitate necessary changes. As examples, more opportunities should be made available to the public to increase physical activity in the community. The school curriculum on health issues, which is woefully inadequate in most places, should be revised accordingly. Increased pressure should be exerted on the food and restaurant industries to develop healthier products and to make food labels more easily understood by the consumer. Although some favorable changes have been made voluntarily by these industries, new federal legislation and policies will likely be required to achieve the necessary goals.

In addition, the healthcare system should be modified to broaden the education of physicians and other practitioners on nutrition and disease prevention and to reorganize physicians’ offices and clinics to facilitate preventative practices. Furthermore, physicians, nutritionists, and other clinicians who are already overburdened in their practices will need to
be compensated adequately for their time spent in promoting healthy lifestyles in their patients.

Much can be done and should be done to encourage healthier lifestyles in our population. Success of these various approaches would not only have a substantial effect in dealing with the problems of prehypertension and hypertension but could also profoundly influence the overall health of the population.

Although risk factor–specific guidelines have been of value for improving the detection and management of hypertension, dyslipidemias, obesity, and diabetes, in the future it may be desirable to consolidate them into one document that deals with total CVD risk. Many common features are shared by each of these guidelines, and their integration into a unified set of recommendations may improve their usefulness to clinicians.

Disclosures

None.

References


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