Behavior Changes and the Prevention of High Blood Pressure

Workshop II

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High blood pressure is among the most common and most important of the risk factors for cardiovascular and renal diseases.1 Recent estimates based on the 1988-1991 National Health and Nutrition Examination Survey indicate that approximately 50,000,000 people in the United States have high blood pressure. Despite the clear benefits of treating established hypertension, this approach alone will not prevent all blood pressure–related disease in the population because blood pressure–related vascular complications can occur before the onset of established hypertension. The blood pressure–cardiovascular disease risk relation is continuous and progressive, even within the normotensive blood pressure range. Furthermore, it is difficult to ensure that all hypertensive patients are identified and treated adequately.2,3 Even those who derive optimal benefit from antihypertensive treatment are likely to have a higher risk of morbidity and mortality than their untreated normotensive counterparts with a similar blood pressure.4 Moreover, once treatment with pharmacological therapy is initiated, there will inevitably be some adverse effects. For these reasons, hypertension treatment is an important but incomplete response to the population burden of blood pressure–related cardiovascular disease.

Primary prevention of hypertension is a natural extension of hypertension treatment and provides an important opportunity to interrupt and prevent the costly cycle of managing hypertension and its complications. Therefore, we encourage a focus on primary prevention for normotensive people as well as for those with high-normal blood pressure or hypertension. Primary prevention of hypertension can be accomplished through interventions on a general-population level (population strategy) with the objective of shifting the distribution of blood pressure downward. This approach should be complemented by efforts to lower blood pressure among the higher-risk populations (targeted strategy), which include African-Americans, people with high-normal blood pressure, those with a family history of hypertension, and people with one or more life-style factors that contribute to age-related increases in blood pressure. The life-style factors that are directly related to the development of hypertension include excessive consumption of calories, leading to obesity; high sodium chloride intake; excessive alcohol consumption; and physical inactivity. Moreover, interventions in these behaviors have shown promise for preventing high blood pressure.5 Therefore, a behavioral approach, as discussed below, is the basis for policy and intervention strategies to prevent hypertension. It is important to integrate this strategy with emphasis on other behavioral patterns that interact with high blood pressure to increase cardiovascular risk, such as smoking or dietary practices that increase dyslipidemia. Evidence of the efficacy of changing these practices is more convincing than that for supplementation with potassium, calcium, magnesium, fish oils, or fiber or for alteration in macronutrient consumption and stress-related behaviors; however, these latter factors are recommended as priorities for further research.

Intervention programs in community- and practice-based settings indicate that making the desired life-style changes is potentially feasible.6-9 To achieve population changes in risk behaviors, additional public education will be necessary to underscore the importance of life-style factors in the development of hypertension, as will enhanced education of health care providers to encourage and facilitate their active participation in hypertension prevention. The involvement of patient advocacy groups to focus attention on the prevention and control of high blood pressure is also important. Objectives for change in the national prevalence of factors that increase the risk of high blood pressure should be consistent with those of Healthy People 2000, for example, to increase to at least 90% the proportion of people with high blood pressure who are taking action to control it.10 Achievement of these objectives should include enhanced public, professional, and patient educational programs as well as policies to support such changes, including reimbursement for preventive counseling, changes in food manufacturing and availability, and increased public access to facilities for physical activity. Moreover, additional attention should be given to research questions related to prevention of high blood pressure. The potential for benefit makes primary prevention of hypertension, though challenging, an important national health goal.
Behavioral Patterns and Their Implications

Weight Control

Both cross-sectional and prospective observational studies have identified a strong correlation between various measures of weight and blood pressure, as well as a stepwise increase in blood pressure with progressively higher body-mass index. In most studies, being overweight results in a twofold to sixfold increase in the risk of developing hypertension.\textsuperscript{11-15} Overweight is particularly prevalent in African-American females.\textsuperscript{16} Centrally distributed obesity is of particular concern in the development of hypertension and coronary heart disease.\textsuperscript{17}

The high prevalence of overweight in the US population (26\% of US adults\textsuperscript{18}), combined with the corresponding increase in risk of developing high blood pressure, has led to estimates that 20\% to 30\% of cases of hypertension can be attributed to obesity. Thus, weight loss has the potential to be a powerful means of preventing hypertension and of decreasing the incidence of non—insulin-dependent diabetes, which augments the risk of hypertension. Small amounts of weight loss can lead to blood pressure reduction even when ideal weight is not achieved.

Clinical trials in both hypertensive and normotensive people have documented that loss of excess weight reduces systolic and diastolic blood pressure.\textsuperscript{5,19-21} In one study, weight loss reduced the incidence of hypertension by up to approximately 50\%. Weight loss was not associated with adverse effects and tended to affect lipid and lipoprotein profiles favorably. In addition, weight loss can favorably affect glucose tolerance and serum uric acid.\textsuperscript{22}

Reasonable weight control is recommended for the general public. In addition, more intensive, targeted approaches are recommended for high-risk groups such as families with a history of hypertension, especially with complications of hypertension, and people with high-normal blood pressure (Stage I, systolic blood pressure [130-139 mm Hg] and/or diastolic blood pressure [85-89 mm Hg]). It is further recommended that approaches be developed to help children prevent weight gain. In particular, community-based strategies with culturally sensitive local leadership and ownership are advocated for high-risk populations. Changes in manufacturing and distribution to make low-calorie nutritious foods available are essential, along with behavioral change at the individual and community levels.

Salt Intake

People in most industrialized societies, including the United States, consume between 100 and 200 mmol sodium per day (approximately 6 to 12 g salt or 2.5 to 5.0 g sodium). This far exceeds physiological need. A large body of evidence from observational and interpopulational studies documents the presence of a relation between sodium intake and blood pressure.\textsuperscript{23,24} In a recent ecological analysis of 24 communities, with data from 37,000 people, a difference in sodium intake of 100 mmol/day was associated with differences in systolic blood pressure that ranged from 5 mm Hg at ages 15 to 19 to 10 mm Hg at ages 60 to 69.\textsuperscript{25} The difference was larger for those with higher blood pressure. The results of intrapopulation studies of the relation between sodium intake and blood pressure have been more varied, perhaps because of methodological problems.\textsuperscript{26} In more recent studies designed to overcome these difficulties, a significant positive relation has been noted.\textsuperscript{27-29} Studies with pooled estimates provide strong evidence for a significant blood pressure—lowering effect of reduced sodium intake in both normotensive and hypertensive participants.\textsuperscript{18,29} The reductions in blood pressure were larger for older adults and those with a higher baseline level of blood pressure. The recently published Trials of Hypertension Prevention, Phase I, sodium reduction trial\textsuperscript{21} and the randomized, double-blinded Study of Sodium and Blood Pressure sodium chloride repletion trial\textsuperscript{30} give further evidence for the hypotensive effect of even a modest reduction in sodium consumption.

There is some variation in the studies and it is not now possible to identify which people will have the greatest response; however, the benefits of reducing salt intake on a population basis outweigh the concerns. Moreover, because sodium from processed foods constitutes approximately 70\% of total intake, there is a great potential for industry to contribute to a biologically significant reduction in sodium intake on the population level.

A reduction in salt intake in the general population is strongly recommended, consistent with the recommendations of the Task Force of the National Heart, Lung, and Blood Institute on Primary Prevention of High Blood Pressure (Arch Intern Med. 1993; 153). A reduction to no more than 6 g/day is recommended for particular populations such as those with hypertension or high-normal blood pressure, because sodium reduction is likely to be more effective. In addition, young people should be encouraged to establish healthier eating behaviors. Industry is strongly encouraged to manufacture and make available, in all markets, low-salt, affordable foods. It is essential that such changes be made in order to effectively promote behavioral changes at individual, family, and community levels.

Reduced Alcohol Consumption

Almost all of the more than 30 cross-sectional studies conducted have identified a positive and independent association between excessive levels of alcohol intake (three or more drinks or roughly 40 g ethanol per day) and increased blood pressure. It has been estimated that as much as 5\% to 7\% of the overall prevalence of hypertension can be attributed to excessive alcohol intake.\textsuperscript{31,32} Not only have prospective studies provided consistent evidence of a strong positive relation between alcohol intake and blood pressure, but change in alcohol intake has been associated with subsequent change in blood pressure.\textsuperscript{33} Several clinical trials of the effect of stopping or reducing alcohol intake on blood pressure have shown consistent, significant reductions in blood pressure, independent of weight change.\textsuperscript{34,35}

To minimize the risk of hypertension, it is recommended that people should not consume more than the equivalent of two alcoholic drinks per day. This is of particular importance to people who have high-normal blood pressure or hypertension or who are at increased risk of hypertension. Moreover, professional education about the association between alcohol consumption and blood pressure elevation should be emphasized.
Physical Activity

While the results of studies investigating the relation between physical activity and blood pressure are not as strong or consistent as those related to other risk factors, observational studies have demonstrated an inverse association between levels of physical activity and blood pressure, independent of obesity.36-38 Clinical trials also provide evidence that increased physical activity, in both normotensive and hypertensive people, results in a reduction of both systolic and diastolic blood pressure.39 Low- to moderate-intensity exercise is as effective as high-intensity exercise in reducing blood pressure in patients with hypertension.40 The benefits of physical activity may be through lowering of blood pressure, weight control, or both.

Given the high prevalence of a sedentary life-style in the United States, frequent moderate-intensity, low-resistance, dynamic physical activity such as walking, swimming, cycling, or dancing is recommended to the public. It is important to develop physical activity programs and goals consistent with a person’s life-style, so the changes made are likely to be maintained. It is further recommended that there be increased opportunities for physical activities at worksites, schools, and public areas such as malls and parks.

Channels for Educational Interventions

There is considerable evidence that programs delivered through specific channels (eg, schools) are quite effective in reaching the public at large as well as specific populations.5-9 Particular strategies include involving the media, implementing community programs, providing patient information in physicians’ offices, and providing self-help materials for individuals, schools, worksites, and senior centers.

Adherence to Interventions

Effectiveness of all life-style changes is dependent on long-term adherence, the key to success. Adherence to recommendations is enhanced by educational approaches and interventions that have specific attainable goals, that are sensitive to the culture of the population or individual, that tailor the approach to the individual’s daily circumstances, that can provide daily or periodic reinforcement, and that can be monitored and adapted as needed.41 Long-term adherence is enhanced by effective communication from the health care provider, who should elicit patient concerns and questions, provide positive reinforcement and feedback, and address misconceptions (eg, that blood pressure control implies cure) that can lead to discontinuance of treatment. Providing more opportunities for implementing and monitoring recommended activities, for example at the worksite or at church- and community-based sites, will also enhance long-term adherence.9,42,43

Reimbursement for Preventive Counseling

Because of the importance of enhancing provision and maintenance of effective disease prevention programs, the AHA Task Force on Access to Health Care Principles recommends that reimbursement for preventive health care services be provided.

Research Recommendations

Much more information is needed about life-style behaviors and hypertension prevention. Research should be a priority in the following areas:

1. Risk and benefit for each specific behavior.
2. How combinations of behaviors influence risk and benefit and what the most effective interventions for people with multiple risk factors are. The hypertensive person who both smokes and has an elevated cholesterol level is at significantly greater risk of cardiovascular disease because of the interactive effects of the risk factors than the hypertensive person who has neither or only one risk factor. Increased knowledge is needed about possible interactive effects of behaviors, such as excess salt intake, physical inactivity, and low fiber intake, that might demonstrate interactive rather than single main effects in imparting risks.
3. How long-term adherence to behavioral recommendations can be increased, as well as how interventions for the general public and specific populations can be implemented cost-effectively. This is particularly relevant for high-risk populations (eg, minorities and low-income groups), in which more community-based research is advocated.
4. How health professionals can be more effective in helping their patients make behavioral changes.
5. Examination of other behaviors for which there is not sufficient evidence to recommend policy at this time but that warrant further investigation. These include potassium, calcium, magnesium, and fish oil supplementation, increased fiber and decreased fat intake, and stress.

References

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