Risks of Untreated Hypertension
A Discussion
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There is a strong and graded association between blood pressure and the incidence of major coronary heart disease manifestations, congestive heart failure, stroke, and total mortality. The risk of any of these manifestations is also modified by other risk factors. Tobacco smoking affects the risk for all of the previously mentioned end points. Generally, lipid disturbances are only important predictors of coronary heart disease and total mortality. Several facts indicate that elevated blood pressure is causally related to the end points. There are, however, positive relations between blood pressure levels and heart rate, serum cholesterol level, body mass index, and, according to some studies, glucose intolerance. Some more basic abnormality may be responsible for the blood pressure increase and the increases in these other factors. Hypothetically, this abnormality may be more fundamentally related to some of the end points than is hypertension itself. If that is the case, then the type of antihypertensive treatment may be of decisive importance. Different end points may be affected differently by antihypertensive drugs, a factor that may be essential in the choice of drug treatment. Proper management of other risk factors is also essential in the prevention of cardiovascular disease. (Hypertension 1989;13(suppl I):I-33–I-35)

This article is a comment on the articles by Stamler et al,1 Stokes et al,2 and Whelton and Klag.3 There is general agreement that blood pressure is a powerful predictor of major coronary heart disease (CHD) end points like myocardial infarction and sudden coronary death, stroke, and congestive heart failure (CHF), as well as total mortality. Within a population, the value of a patient’s blood pressure is an accurate guide to that individual’s risk of subsequently developing any of these end points. The shape of the blood pressure–risk curve differs for different end points. With increasing blood pressure levels, the risk for CHD increases much more gradually than that for stroke. This gradual risk increase is also seen in more recent epidemiological studies that have included patients who have been treated for hypertension.4,5 The different blood pressure–risk curves for different end points, as well as differences in risk patterns between populations, can, at least to some extent, be explained by the contribution of other risk factors for CHD, stroke, and CHF.

Although preventive actions like the pharmacological or nonpharmacological treatment of elevated blood pressure are the most logical interventive steps in our efforts to minimize the effects of high blood pressure, efforts aimed at establishing the basic mechanisms whereby increased blood pressure is associated with increased morbidity and mortality are also important. In fact, it is possible that administration of several drugs presently used for lowering blood pressure may not provide the best method to prevent complications associated with high blood pressure. It may be that more basic disturbances will need to be influenced.

Risk Factors for Coronary Heart Disease

Combined results from the many prospective epidemiological studies of risk factors for major CHD events indicate that heredity for CHD, elevated total serum cholesterol levels (or better, elevated levels of the low to high density lipoprotein ratio), elevated blood pressure, tobacco smoking, diabetes mellitus, and, according to some studies, psychological stress and low social class are independent risk factors for such manifestations. Lipid disturbances, tobacco smoking, and elevated blood pressure are, without question, the most important risk factors contributing to population-attributable risk.

The combined effect of several risk factors may well explain the different incidences of major CHD manifestations in different countries, mainly because levels of lipid disturbances and smoking habits are so different. The effect of treatment may also vary considerably. Because several risk factors are associated with CHD, any treatment program should

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include not only the treatment of elevated blood pressure but also the normalization of other risk factors in communities where CHD is common. In fact, normalization of risk factors other than elevated blood pressure may, in some individuals, be more important than lowering blood pressure, especially if the antihypertensive agent has adverse effects on other CHD risk factors like blood lipids.

Risk Factors for Stroke

Considerably fewer studies have investigated the risk factor pattern for stroke. Elevated blood pressure is a consistent and strong risk factor for hemorrhagic and thrombotic stroke, and tobacco smoking seems to be the second most important factor. Hypercholesterolemia, however, has generally not been associated with increased risk for stroke. Recent studies have suggested that elevated fibrinogen levels in particular may be associated with stroke, but they are also associated with other major CHD manifestations.6–8

The risk factor pattern for stroke clearly indicates that antihypertensive treatment and cessation of smoking are the most important preventive actions that can be taken. The different risk factor patterns for stroke also point to a different pathophysiology for cerebrovascular events compared with the risk factor pattern for coronary events.

Risk Factors for Congestive Heart Failure

Elevated blood pressure is also the major risk factor for CHF, and trial results combined with clinical experience indicate that modern aggressive antihypertensive treatment has decreased the incidence of CHF or at least postponed its development. In parallel with the decreasing prevalence of CHF due to rheumatic heart disease and other valvular diseases, CHD is, without question, the most important cause of CHF. Prevention of CHF should logically include measures similar to those for the prevention of CHD, including antihypertensive treatment, smoking cessation, and dietary advice to correct lipid disturbances. Antihypertensive treatment deserves special attention because it unloads the failing heart.

Prognostic Factors Among Hypertensive Patients

From the above-mentioned epidemiological studies, it is evident that factors other than blood pressure level influence prognosis in the general population. It is also interesting to note which factors are important for prognosis among patients who are under antihypertensive treatment. Blood pressure alone is not a reliable predictor of further complications.9 However, Beevers et al10 and Bulbitt et al11 showed that systolic blood pressure measured at the start of follow-up continues to be a risk factor among patients being treated for hypertension. Various indications of hypertensive end-organ damage like proteinuria11,12 and electrocardiogram abnormalities are also important indicators of increased risk.12–14 The presence of angina pectoris has also been independently associated with increased risk for major CHD events.12 In addition, tobacco smoking and elevated serum cholesterol values, as in the general population, were independent risk factors in a multivariate analysis among hypertensive patients.12

Conclusion

There is a strong graded association between blood pressure and the incidence of CHD, CHF, stroke, and total mortality. It has been demonstrated that a temporal sequence exists between risk factor increase and disease incidence, a finding that is consistent among the studies. An independent association has been found between the risk factor and the disease, and the epidemiological findings are compatible with findings from other types of investigations. These facts favor the concept of elevated blood pressure as a causative agent to the CHD end points under discussion. However, there are also positive relations between blood pressure levels and heart rate, serum cholesterol level, and body mass index, as well as suggestive evidence of a positive relation between glucose intolerance and high blood pressure.15–18 These findings may indicate that some more basic abnormality is responsible for the blood pressure increase and some of these factors, for example, the increase in heart rate. Increased sympathetic tone is a possible common background mechanism. Treatment directed toward correction of such a basic abnormality may be more important than lowering blood pressure.

Factors associated with increased risk for either CHD or stroke, including lipid disturbances and elevated fibrinogen levels, may also be affected differently by antihypertensive drugs, and such features may be important in the choice of antihypertensive treatment. Long-term and expensive trials are needed to evaluate such questions.

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**KEY WORDS** • hypertension detection and control • cardiovascular risk factors • smoking • lipids • coronary heart disease • stroke • congestive heart failure
Risks of untreated hypertension. A discussion.
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Hypertension. 1989;13:I33
doi: 10.1161/01.HYP.13.5_Suppl.I33
Hypertension is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0194-911X. Online ISSN: 1524-4563

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://hyper.ahajournals.org/content/13/5_Suppl/I33

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