

Editorial Comment

Prehypertension and Metabolic Syndrome: Prevention of Hypertension and Cardiovascular Events

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Cardiovascular mortality and morbidity have not been fully controlled despite great advances in hypertension treatments including lifestyle modification and antihypertensive drugs. Although the importance of lifestyle modification has been emphasized to prevent and to treat hypertension and other metabolic diseases, the number of patients with hypertension, diabetes mellitus, dyslipidemia and obesity has increased. The risk of cardiovascular events increases with the coexistence of hypertension, diabetes mellitus, and dyslipidemia, but also with the coexistence of visceral obesity, high-normal blood pressure (BP), impaired glucose tolerance and dyslipidemia, known as the metabolic syndrome. It is important to establish population strategies to prevent hypertension in order to control subsequent cardiovascular mortality and morbidity.

The following are the classifications of BP according to JNC 7 (The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure): normal (<120/80 mmHg) (1), prehypertension (120–139/80–89 mmHg), stage 1 hypertension (140–159/90–99 mmHg) and stage 2 hypertension (\geq 160/100 mmHg). The prevalence of cardiovascular events increases linearly with BP elevation (2), and significantly increases when the BP is above 120/80 mmHg (3). The classification of BP in JSH 2004 (Japanese Society of Hypertension Guidelines for the Management of Hypertension) (4) is as follows: optimal BP (<120/80 mmHg), normal BP (<130/85 mmHg), high-normal BP (130–139/85–89 mmHg), mild hypertension (140–159/90–99 mmHg), moderate hypertension (160–179/100–109 mmHg) and severe hypertension (\geq 180/110 mmHg). With respect to prehypertension, JSH 2004 men-

tioned that “the introduction of the new concept of ‘prehypertension’ was unnecessary as the concept of high-normal pressure sufficiently indicates the need for primary prevention of hypertension. Also, by regarding a BP of less than 120/80 mmHg as the optimal BP, the guidelines suggest that a normal BP in the range of 120–129/80–84 mmHg is already above the optimal BP level.”

An important clinical implication of prehypertension or high-normal BP is its use as a predictor for hypertension. From a preventive medicine viewpoint, prehypertension or high-normal BP should be prevented. The Jichi Medical School Cohort Study (5) in this issue of *Hypertension Research* revealed the prevalence of prehypertension in a sample of the general Japanese population. They reported that the prevalence of normal BP classified by JNC 7 was 32.7%, that of prehypertension was 33.0% (34.8% in males and 31.8% in females), and that of hypertension was 34.3%. It is unfortunate that one-third of the Japanese population is classified as being prehypertensive and an additional one-third is characterized as hypertensive.

In subjects with optimal BP, the coexistence of obesity and dysglycemia or glucose intolerance may predict progression to prehypertension or high-normal BP. In the case of prehypertension or high-normal BP, the coexistence of these factors may strongly predict progression to hypertension. The Jichi Medical School Cohort Study (5) also revealed the determinants of prehypertension in a sample from the general Japanese population. A body mass index (BMI) calculation of more than 23.0 kg/m² was the strongest determinant, followed by hyperlipidemia and aging in both genders. In females, other determinants included glucose intolerance and a family

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history of hypertension. In males, alcohol consumption was the only other determinant of prehypertension. Although there was a gender difference in determinants of prehypertension, obesity, hyperlipidemia and glucose intolerance are the components of metabolic syndrome.

Metabolic syndrome is a well-known risk factor for cardiovascular diseases and includes visceral obesity, hypertension, diabetes mellitus, and dyslipidemia. The coexistence of these diseases and other cardiovascular risk factors such as cigarette smoking result in a synergistic increase in cardiovascular mortality and morbidity (6). Furthermore, the importance of metabolic syndrome is made manifest as it persists as a risk of cardiovascular events even when it includes visceral obesity, prehypertension, glucose intolerance, and dyslipidemia. Although each of these factors alone will not greatly influence cardiovascular events, together, they become a risk for cardiovascular events. The Ministry of Health, Labour and Welfare have developed the specified health examination and health guidance system in order to prevent diabetes mellitus and other metabolic disorders.

In order to prevent the development of hypertension, early detection and prevention of prehypertension will be an important issue in Japan. Ishikawa *et al.* (5) observed that a mild increase in BMI of ≥ 23.0 kg/m² correlates to BP elevation, and that this threshold value will be severe to maintain less than that. Measures to decrease body weight, which are easily accessible, will be required.

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