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EDITORIAL

Special Issue: Current evidence and perspectives for hypertension management in Asia

Lifetime home BP-centered approach is the core from onset to aggravation of hypertension

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Hypertension is the lifetime risk for organ damage and cardiovascular disease. The risk of high blood pressure (BP) is initiated before the diagnosis of hypertension. From healthy younger adult subjects with high-normal BP in the early lifetime stage to the elderly hypertensive patients with cardiovascular risk factors and/or organ damage, higher BP exhibits increased the risk than normotensive subjects. In this issue of Hypertension Research, two prospective papers from Suita study demonstrated the significant increased risk of cardiovascular disease (CVD) and heart failure even in high-normal BP [1, 2]. Compared to normal BP (systolic BP (SBP) < 120 and diastolic BP (DBP) < 80 mmHg), elevated BP (SBP 130–139 and/or DBP 80–89 mmHg) and hypertension (SBP ≥ 140 and/or DBP ≥ 90 mmHg) were associated with a higher risk of CVD, stroke, coronary heart disease (CHD) and heart failure. In addition, high-normal BP (SBP 120–129 and DBP < 80 mmHg) was associated with a higher risk of CVD and CHD. CVD preventive interventions should begin at lower BP levels than those applied in the 2019 Japanese Society of Hypertension (JSH2019) guidelines.

Proposal of home BP-centered approach

Here we are proposing the home BP-centered approach for the management of hypertension. This approach is effective from the healthcare to medical treatment for the suppression of the onset and aggravation of hypertension (Fig. 1). Recent guidelines and recommendations stressed the importance of home BP for the management of hypertension [3–6]. There are accumulated prospective evidence that home BP is the stronger prognostic risk factor of cardiovascular events both in a community-based populations and in hypertensive patients [7, 8]. The Kamogawa-HBP study on the diabetic patients demonstrated that higher home BP is associated with the risk of cardiovascular events and the progression of diabetic nephropathy [9, 10]. However, home BP, especially morning home BP has not been controlled yet. In total, 50% or more medicated patients have not achieved morning SBP controlled <135 mmHg [11, 12]. The JSH2019 stressed the importance of home BP expressed by the sentence that when there is discrepancy in the diagnosis of hypertension between office and home BPs, the home BP-based diagnosed should be prioritized [3, 13]. In addition, the latest guidelines Taiwan Hypertension Society recommend diagnosing hypertension by home BP [14].

Especially, home BP-centered approach is facilitated by the recent advance in digital techniques. Hypertension Research is now focusing and facilitating the research on the digital hypertension [15]. In the era of COVID-19 pandemic, telemedicine using digital techniques have been widely introduced into the clinical practice [16–19]. Thus, home BP-centered approach on the home BP-based diagnosis and treatment of hypertension is the primetime. Home BP monitoring per se may increase self-efficacy of lifestyle modification and drug adherence, and improve patient-doctor relationship and clinical inertia. A metaanalysis on the effect of home BP monitoring demonstrated that home BP monitoring with the education and/or consultation significantly lower BP [20]. In 2021, the first randomized control trial of digital therapeutics (application) for hypertension (HERB-DH1) demonstrated the significant 24-h SBP reduction, compared with control group [21, 22]. Both digital therapeutics group and control group received

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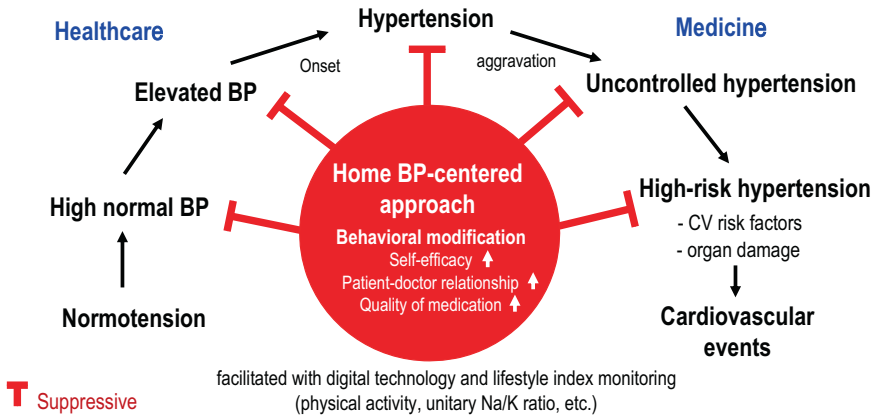

Fig. 1 Lifetime home BP-centered approach from onset to aggravation of hypertension.

doctor's routine lifestyle education with home BP morning. Morning home SBP significantly reduced by 10.9 mmHg in digital therapeutics group, and by 6.2 mmHg in the control group (the group-difference: 4.3 mmHg, $p < 0.001$) [21, 22]. In 2022, in Japan, the digital therapeutics of hypertension was first approved by regulatory authority in the condition of combined use of home BP monitoring [23]. This first hypertension digital therapeutics facilitated to support the patients to get correct knowledge and to execute the six components of lifestyle modification such as salt restriction, adequate body weight, exercise, alcohol restriction, sleep and stress management [21]. In the platform of this digital therapeutics, the daily-base time-trend data of home BP and self-reported behavioral modification was shared by patients and sometimes by doctors, resulting in improving the patient-doctor relationship. Thus, the home BP monitoring with some objective behavioral index (B-index) would be the first step to modify the personal behaviors.

B-index of sodium reduction

Sodium restriction, the validated BP-lowering behavioral modification [24–26], would be effective in Asia, because Asians have higher prevalence of masked hypertension with higher salt intake [6, 27]. In the first hypertension digital therapeutics, we used self-reported sodium intake score, and found that home BP reduction was correlated with the reduction of this score [19]. The urinary Na/K ratio could be considered as the objective B-index of dietary intervention to reduce the onset and aggravation of hypertension. There are accumulated evidence of research on urinary sodium (Na)/potassium (K) ratio (urinary Na/K ratio) [28–30]. Salt substitutes with reduced sodium levels and increased potassium levels have been shown to lower BP. In addition, a recent open-label, cluster-randomized trial of salt substitute (75% sodium chloride and 25% potassium chloride) vs. regular salt (100% sodium chloride), in community-dwelling persons who had a history of stroke or were 60 years of age or older and had high BP, the rates of stroke, major cardiovascular events, and death from any cause were lower with the salt substitute than with regular salt [31].

The cross-sectional study in this issue demonstrated that the urinary Na/K ratio was associated with SBP in 684 community-dwelling older adults older adults (mean age, 76.8 years) [32]. Interestingly, urinary Na/K ratio was influenced by other habitual dietary patterns. A positive history of daily milk consumption predicted a mean urinary Na/K ratio of 2.8, and a negative history of daily milk consumption predicted a mean urinary Na/K ratio of 3.3. Furthermore, the frequency of fruit and vegetable consumption also predicted the urinary Na/K ratio. The relationship between the urinary Na/K ratio and hypertension was influenced by the frequency of consumption of milk, fruits, and vegetables in the subjects, indicating the importance of comprehensive nutritional education in older subjects.

The lifetime home BP-centered approach combined with salt restriction is the core in the national and global health strategy from heath care to medicine to reduce cardiovascular event "zero". This strategy could be facilitated by digital era with COVID-19 pandemic [33].

Compliance with ethical standards

Conflict of interest The authors declare no competing interests.

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