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COMMENTARY

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Effect of Social, regional, and education status and season on blood pressure

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In current issue of the Journal of Clinical Hypertension, Nishizawa et al investigated the impact of outdoor temperature (winter vs summer) and housing conditions affected by Great East Japan Earthquake in 2011 on morning blood pressure surge (MBPS).[1] Previously, Kario enlightened typical increase in incidence of CVD (hypertension (HT) related, fatal arrhythmia, Takotsubo cardiomyopathy, sudden death etc) after disasters through physical and mental stress.[2] Regarding this fact, it is important to determine social determinants (housing conditions as in this article) and possible interventions to reduce deleterious effects of natural disasters on human health.

The study performed 24 hours ambulatory blood pressure monitoring in both winter and summer to determine MBPS and how outdoor temperature influences grade of MBPS. It is known that ambulatory blood pressure measurement (ABPM) provides more accurate information about diurnal BP pattern compared with measurements in office settings.[3,4] Although ABPM is not involved in daily practice, studies revealed the superiority of ABPM to detect circadian or seasonal BP variability and to predict adverse outcomes resulting from HT.[4]

Circadian BP in normo- and hypertensive patients follows the specific pattern that a peak in BP occurs around 6 AM (morning surge) preceded by lowest BP levels around 2-4 AM (BP dipping). Healthy individuals have normal dipping BP pattern which is defined as 10%-20% nocturnal fall in BP.[5]

In previous studies, Kanbay et al highlighted that increased morning BP surge (MBPS) and lack of nocturnal BP drop (non-dipping HT) are related with worse cardiovascular outcome and augmented target organ damage such as renal disease or stroke[5-7](Figure 1). Furthermore, Turak et al proved MBPS as an independent risk factor for chronic kidney disease.[8] In the same line, Rizzoni et al suggested that MBPS is correlated with structural changes in micro and microvasculature as indicated by increased intima-media thickness (IMT). This vasculature changes and hemodynamic stress further augment MBPS concluding with vicious cycle that amplifies each other.[9] Another study similarly showed increase in IMT but also increased inflammatory markers including interleukin-6, interleukin-18, and C-reactive protein.[10]

Non-dipping HTN is mainly explained with impaired autonomous nervous system regulation and sympathetic system activation particularly increased α-adrenergic activity.[5] Likewise, MBPS stems from various factors including autonomic dysregulation, renin-angiotensin system activation, altered cortisol levels, arterial stiffness, or endothelial dysfunction.[8] Further, the study conducted by Turak and his colleagues highlighted association between serum uric acid (SUA) level and MBPS as a consequence of uric acid induced endothelial dysfunction and decreased NO levels.[11]

From another perspective, the study revealed significantly higher morning and daytime systolic BP levels during winter times. Similarly, many previous studies indicated increased incidence of cardiovascular events such as myocardial infarction, sudden death, and stroke coincides with morning and winter times.[12] Murakami et al proved direct impact of cold outdoor temperature on amplified MBPS and decreased diurnal BP cycle. Likewise, Modesti et al revealed association between winter times and pre-waking morning BP. Possible explanation for this phenomenon is cold weather induced vasopressor effect with sympathetic system activation and vasoconstriction.[12]

The major drawback of the study as mentioned in the paper is the lack of definition for characteristics of housing options in detail. The study unexpectedly pointed out having occupant-owned house as one of determinants of winter morning surge. It is known that indoor temperature has more significant impact on systolic BP than outdoor temperature. However, indoor temperature was not measured in the study. Degree of insulation in both occupant-owned house and temporary house is not known and stays to be explained. However, the study remains to be a hint for us to emphasize importance of providing suitable environmental conditions after disasters.

The study determined age ≥75 years as a risk factor of highest quintile for winter morning surge. This finding is compatible with previous studies. Lee and colleagues revealed the age as an

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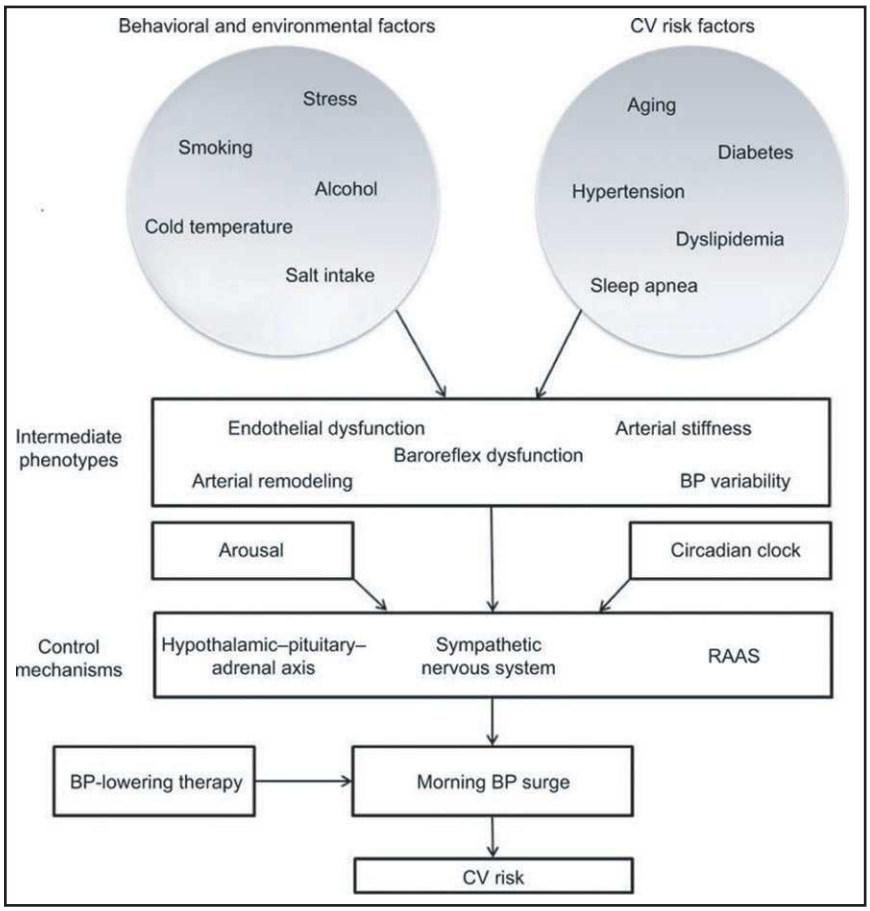


FIGURE 1 Factors related with increased morning blood pressure surge and related cardiovascular mortality. BP, blood pressure; CV, cardiovascular; RAAS, renin angiotensin aldosterone system

independent risk factor for MBPS. From physiologic perspective, impaired endothelial function, arterial stiffness and decline in baroreceptor reflex with aging rationalize this finding.[13-15]

Bertelsen et al pointed out the fundamental importance of education as a social determinant of health on managing global health problems. It is shown that low education level is associated with cardiovascular risk factors including hypertension, obesity, or metabolic syndrome. Consequently, it is important to recognize and emphasize the role of education on disadvantageous population in specific regions as evacuees after earthquake to minimize detrimental effect of natural disasters.[16]

Finally, early morning blood pressure surge can be a new therapeutic approach to decrease HT related adverse events. It might be important to give information about the effect of season and social status on BP to the patients, and future studies should focus on this interesting topic.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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