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EDITORIAL

"Morning BP Action in Winter" initiative: confronting cardiovascular "heat shock"

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Abstract

Seasonal variations in blood pressure (BP) and cardiovascular risk represent one of the most consistently reproduced yet under-recognized phenomena in hypertension research. In Japan, where winter temperatures can fluctuate sharply in both outdoor and indoor environments, the burden of winter-associated cardiovascular events is strikingly visible in epidemiological data. The so-called "heat shock" phenomenon is defined as acute cardiovascular events triggered by sudden temperature changes. Recent statements by the Japanese Society of Hypertension, including the initiative "Morning BP Action in Winter," emphasize that winter mornings constitute a uniquely hazardous physiological "heat shock" window —one in which sympathetic activation, thermal stress, and behavioral triggers converge to sharply elevate BP and precipitate acute cardiovascular events. This editorial commentary expands on the scientific rationale, clinical implications, and public health significance of this initiative, aiming to contextualize winter morning BP management as an essential preventive strategy.

Keywords Asakatsu · Morning blood pressure · Winter · Heat shock · Thermal management

Winter as a cardiovascular stressor: a convergence of environmental and physiologic challenges

Multiple population-based datasets in Japan demonstrate a clear seasonal pattern in cardiovascular mortality, including deaths due to heart failure, stroke, intracerebral hemorrhage, and acute myocardial infarction (Fig. 1). These peaks consistently occur during December through February, coinciding with declines in average ambient temperature. The pattern is not only reproducible year after year but also statistically robust, highlighting an intrinsic vulnerability of the human cardiovascular system to cold stimuli. Cold exposure induces peripheral vasoconstriction, elevates systemic vascular resistance, and increases BP. These physiological adaptations, while protective from a thermoregulatory standpoint, impose increased hemodynamic load on the heart and vasculature. Moreover, cold exposure promotes hypercoagulability, including increased platelet activity and altered fibrinolytic balance, further predisposing individuals to thrombotic events. In older adults and those with established atherosclerosis, these changes can precipitate plaque rupture, arrhythmic events,

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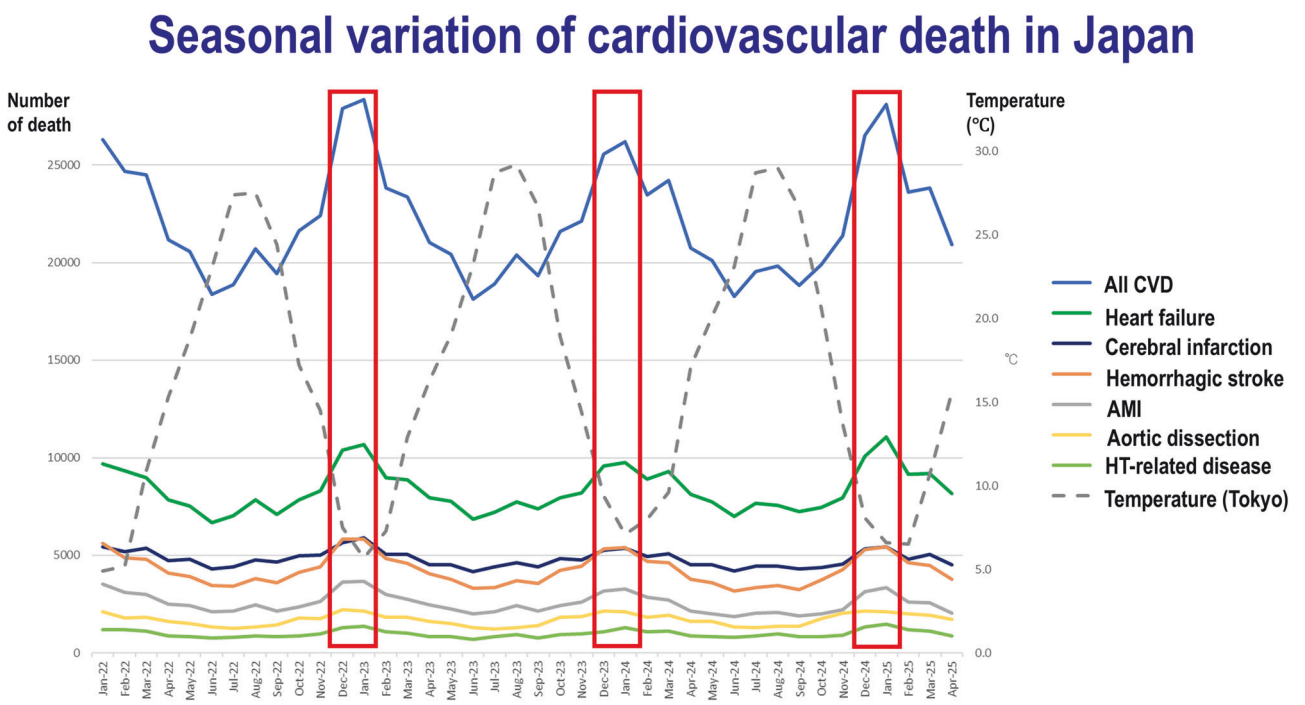

Fig. 1 Seasonal variation of cardiovascular death in Japan. Source: Ministry of Health, Labor and Welfare: Monthly Vital Statistics Report (Preliminary Data), and Japan Meteorological Agency: Monthly Mean of Daily Average Temperature (°C). AMI, acute myocardial infarction; CVD, cardiovascular disease; HT, hypertension. Red boxes indicate peaks in cardiovascular death during the months of December and January

or cerebrovascular injury. The Japanese residential environment further amplifies these risks. Many homes lack adequate insulation compared with housing standards in northern Europe, resulting in substantial intra-home temperature gradients—especially between heated living spaces and unheated corridors, bathrooms, and toilets. The high prevalence of "heat shock"–related accidents in domestic settings underscores this unique environmental hazard. In this context, the so-called "heat shock" phenomenon is defined as acute cardiovascular events triggered by sudden indoor temperature changes.

Why winter mornings are especially dangerous: the intersection of circadian rhythms and cold stress

Winter alone increases cardiovascular event risk [1], and cardiovascular events occur more frequently in the morning [2], suggesting that winter mornings represent a compounded danger [3]. The morning surge in BP is a well-documented circadian phenomenon associated with increased risk of cardiovascular events, and with heightened sympathetic nervous system activity, cortisol release, and reactivation of physical and mental activity after sleep [3–6]. This physiological surge, typically manageable in healthy conditions, becomes amplified under cold exposure. Several factors synergistically elevate BP in winter mornings:

1. Sympathetic hyperactivation
   Upon awakening, sympathetic output rapidly increases. Cold exposure augments this further, leading to pronounced vasoconstriction and tachycardia [7, 8].
2. Low indoor temperatures at wake-up time
   Heating systems in many Japanese homes are inactive during the night, resulting in sharp declines in bedroom and corridor temperatures by early morning [9].
3. Peripheral cooling and vasoconstriction during sleep
   Reduced circulation to the extremities heightens vascular reactivity upon awakening.
4. Immediate physical activity after rising
   Transitioning from lying to standing, walking to the bathroom, or preparing breakfast imposes abrupt hemodynamic demands that can sharply increase BP [10, 11].

Together, these factors produce a BP trajectory in winter that is not merely elevated but labile, with steep rises that can destabilize vulnerable vascular beds.

The hidden burden of morning hypertension in winter

Morning hypertension is a strong predictor of stroke, heart failure exacerbations, and coronary events [12–16]. Home and ambulatory BP monitoring have demonstrated significant seasonal variation, with a peak in winter [17–23]. Yet in clinical practice, morning BP is often underestimated due to reliance on in-office measurements, which cannot capture time-specific fluctuations. Home BP monitoring reveals that winter morning BP is frequently much higher than clinic BP, a phenomenon sometimes referred to as "masked morning hypertension" [22, 23]. The Japanese Society of Hypertension has issued the Declaration for the Eradication of Morning Hypertension BP initiative—to promote morning home BP measurement [24–27]. Concerning home BP in winter, quantitative data from the Nationwide Smart Wellness Housing Survey suggest that a 10 °C decrease in indoor temperature can raise morning BP by approximately 8 mmHg [28], a clinically meaningful change that would substantially increase cardiovascular risk. For patients on antihypertensive medications, inadequate nocturnal or early-morning coverage exacerbates this issue. Thus, winter morning hypertension [3] represents not merely a lifestyle concern but a pathophysiological and therapeutic challenge requiring attention from both clinicians and public health authorities.

Heat shock as a critical domestic hazard

Heat shock—rapid BP fluctuation due to sudden temperature changes, particularly during bathroom transitions—is responsible for a significant number of winter deaths in Japan. Movement from a warm bedroom to a cold dressing area or bathroom triggers vasoconstriction and marked BP spikes; subsequent immersion into warm bathwater may cause precipitous BP drops, leading to arrhythmias, loss of consciousness, or drowning. The temporal coincidence between peak winter cardiovascular mortality and the period of highest heat shock incidence underscores the need for residential thermal management as an essential cardiovascular preventive measure. It also highlights that winter BP management extends beyond pharmacology and into architectural, behavioral, and societal domains.

Public health implications: extending hypertension management beyond the clinic

Considering that hypertension and its related cardiovascular diseases are life-environment diseases [29], the "Morning BP Action in Winter" initiative is innovative in its emphasis on environmental and behavioral interventions in parallel with traditional pharmacotherapy.

1. Maintaining indoor temperatures at 18–22 °C or higher upon awakening

   This is perhaps the most impactful non-pharmacological approach [29, 30]. Pre-heating bedrooms, corridors, and bathrooms reduces sympathetic activation and mitigates the morning BP surge. The recommendation aligns with WHO housing guidelines [31] and should be promoted as a cardiovascular safety measure, not merely a comfort strategy.
2. Incorporating gentle morning activity ("Asakatsu")

   Light stretching, deep breathing, and consumption of warm beverages can help modulate autonomic activity and promote a smoother BP rise.
3. Daily morning home BP monitoring ("Asakatsu")

   This allows early detection of masked morning hypertension and facilitates timely medication adjustment [6, 32]. Winter-specific monitoring may need to be emphasized in future clinical guidelines.
4. Heating bathrooms and dressing areas to prevent heat shock

   This is a straightforward but underutilized intervention. Subsidies for home insulation and heaters may have substantial population-level impact [30, 33].

By framing winter BP control as "life-saving behavior," the initiative underscores that cardiovascular prevention is not confined to medical settings but requires a holistic, year-round approach tailored to seasonal risks.

Clinical and research perspectives

For clinicians, winter morning hypertension raises several considerations:

- Seasonal adjustment of antihypertensive medication timing or dosing
- Increased use of long-acting agents with sustained 24-h coverage
- Counseling on environmental control and behavioral strategies
- Identifying high-risk groups, including older adults, individuals living alone, and those with a history of stroke or coronary artery disease

From a research perspective, winter morning BP dynamics represent an opportunity to study the interplay between environmental stressors, autonomic regulation, and vascular physiology. Advances in wearable technology, ambient

temperature monitoring, and telemedicine will enable more precise characterization of these interactions [34–36].

Further investigation is also warranted into:

- The threshold temperature at which cardiovascular risk sharply escalates
- Inter-individual differences in thermosensitivity and BP responsiveness [37]
- Population-level benefits of housing insulation programs
- Integration of environmental data into personalized hypertension management algorithms [10].

Ultimately, winter morning hypertension may serve as a model for environmentally modifiable cardiovascular risk.

Conclusion

Winter mornings represent a convergence of environmental cold stress, circadian sympathetic activation, and behavioral triggers that synergistically heighten cardiovascular risk. The "Morning BP Action in Winter" initiative by the Japanese Society of Hypertension reframes this seasonal vulnerability as a preventive opportunity. By encouraging thermal management of indoor environments, gentle morning activity, vigilant home BP monitoring, and mitigation of heat shock risk, the initiative proposes a comprehensive and actionable strategy capable of reducing winter cardiovascular morbidity and mortality. As climate patterns shift globally and temperature variability becomes more pronounced, the lessons from Japan's winter BP challenge will have increasing relevance worldwide. Confronting winter cardiovascular "heat shock" requires not only pharmacologic optimization but also a renewed focus on residential environments, daily routines, and seasonal personalization of hypertension care. In this context, morning BP action in winter is not merely a recommendation—it is an essential component of modern cardiovascular prevention.

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Compliance with ethical standards

Conflict of interest The authors declare no competing interests.

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