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COMMENT

Importance of measuring indoor temperature to understand blood pressure levels and variability at home

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Blood pressure (BP) variability is associated with various organ damages and cardiovascular diseases [1]. Although cardiovascular events largely depend on BP levels, BP variability has also recently been recognized as an important indicator. Cardiovascular events may occur when peaks in BP variability, which span various time frames from beat-to-beat to yearly, coincide, resulting in a dynamic surge in BP [2]. Therefore, understanding BP variability is essential for the prevention of cardiovascular diseases.

The data presented by Kollias et al. [3] are of significant value in understanding BP variability. This stems from their methodology where the same subjects measured office BP (OBP), home BP (HBP), daytime ambulatory BP (dABP), and nighttime ABP (nABP). They showed that OBP, HBP, and dABP were higher in winter compared to those in summer, consistent with evidence in a previous paper [4]. Notably, they found that the standard deviation (SD), coefficient of variation (CV), and average real variability (ARV) for systolic HBP and ABP did not differ in winter and summer. Interestingly, these results regarding HBP variability contrast with a previous study conducted in Japan [5], suggesting a need for further consideration.

One potential explanation for this discrepancy might be the differences in housing conditions between Greece and Japan. According to the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) in Japan, approximately 30% of the nation's 50 million existing houses lack insulation [6]. This fact, coupled with the common practice of intermittently heating only the living room, contributes to unstable indoor temperatures during winter. Research in Japan [7] has indicated that in winter, residents in homes with unstable indoor temperatures experienced greater diurnal and day-to-day variabilities in HBP. As a result, seasonal differences in HBP variability have been observed in Japan, whereas there were no seasonal differences in HBP variability in Greece. However, it should be noted that in the study by Kollias et al. [3], as acknowledged in their limitations, the absence of indoor temperature data prevents definitive verification regarding indoor temperature instabilities.

Given the discussion above, focusing on indoor temperature is crucial for understanding BP variability at home and preventing cardiovascular events, rather than solely considering outdoor temperature. Indeed, prior research has demonstrated a more pronounced association of indoor temperature with BP than outdoor temperature [8, 9], along with a significant and close relationship between indoor temperature and BP [10]. In this context, the World Health Organization (WHO) published guidelines on housing and health in 2018 [11], emphasizing the critical role of managing indoor temperatures to prevent cardiovascular events. The WHO strongly recommends maintaining a minimum indoor temperature of 18 °C to counteract the adverse health effects of cold indoor environments. Additionally, the WHO advocates for the installation of efficient and safe thermal insulation in both new and existing houses. However, in the guidelines, thermal insulation is only conditionally recommended. Given its dual role in both raising and stabilizing indoor temperatures, thermal insulation should be more strongly endorsed as a means to control BP levels and variability. In Fig. 1,

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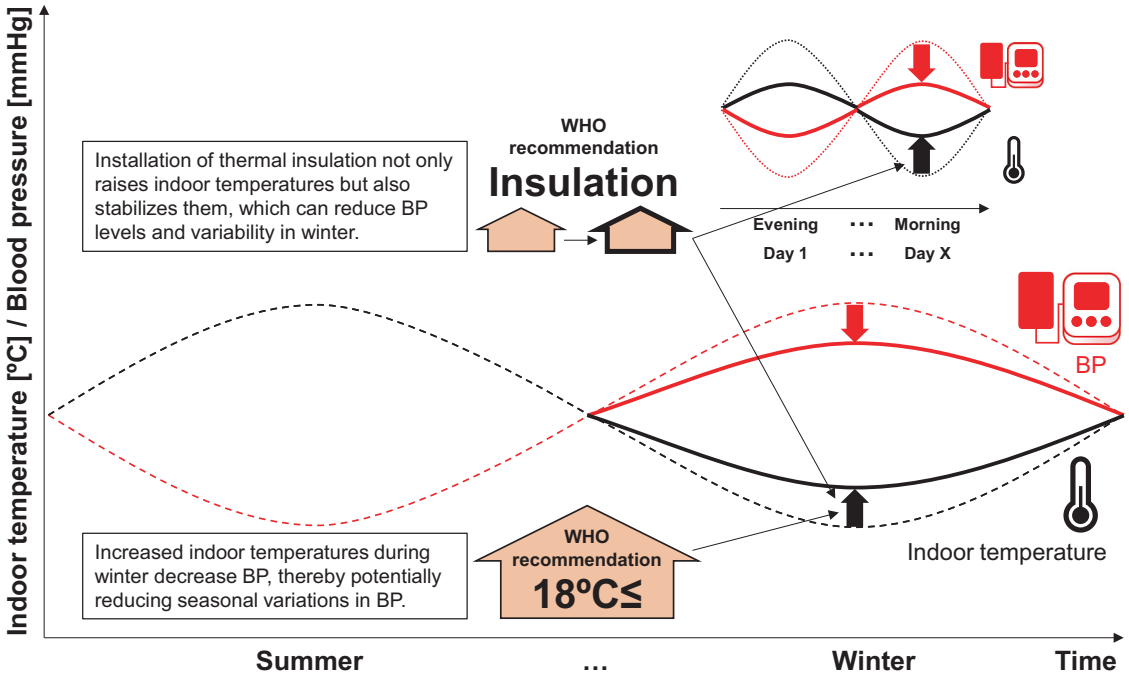

Fig. 1 Linkage between the WHO guidelines' recommendation and BP levels/variability

I summarized the linkage between the WHO guidelines' recommendation and BP levels/variability.

In conclusion, the emerging recognition of BP variability, alongside traditional measures of BP levels, highlights the dynamic and complex nature of cardiovascular risk factors. The findings of Kollias et al. [3] contribute significantly to our understanding of BP variability, offering valuable insights into the seasonal influences on BP measurements. These findings, when contrasted with similar research conducted in Japan, may point towards the influential role of housing conditions, particularly insulation and heating practices, in determining indoor temperature stability and, consequently, BP variability. From a public health perspective, it is imperative to recognize the interplay between indoor environmental conditions and cardiovascular health. By prioritizing interventions that stabilize indoor temperatures, such as improved insulation, we can take a significant step towards reducing the risk of cardiovascular events associated with BP variability. This approach not only aligns with current scientific understanding but also offers a practical pathway to enhance overall cardiovascular health.

Compliance with ethical standards

Conflict of interest The author declares no competing interests.

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