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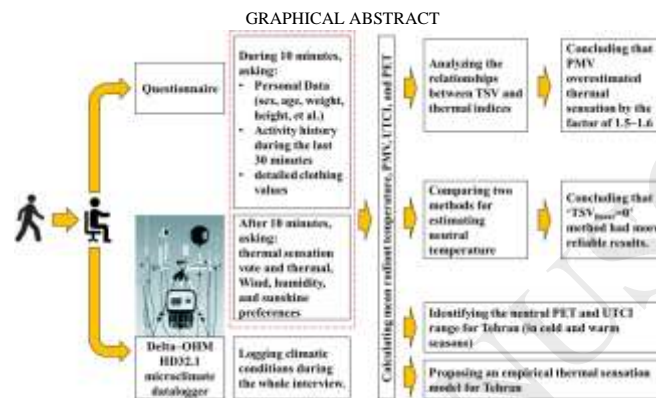
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Seasonal differences of subjective thermal sensation and neutral temperature in an outdoor shaded space in Tehran, Iran

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Abstract

Outdoor thermal comfort influences the outdoor activities, social interactions, tourism, health and wellbeing, or even mortality. Despite the great interest in outdoor thermal comfort, few studies were conducted in arid climates. This study investigated the seasonal differences of outdoor thermal sensation in Tehran (BWk climate), based on 1008 interviews. Also the relationship between three commonly used thermal comfort indices (including UTCI, PET, and PMV) and interviewees' thermal sensation were studied and neutral temperature and neutral range were identified in different seasons. The surveys were conducted on 79 days, periodically, in the four seasons, using microclimatic monitoring as well as subjective interviews. Two analysis approaches (mean/median, and $TSV_{linear=0}$ methods) were applied to show the seasonal differences in neutral temperature. It was found that neutral temperatures, neutral range, and thermal sensations were significantly different, especially between summer, winter, and the two shoulder seasons. Although the two different analysis approaches resulted in noticeably different neutral temperatures, especially in the winter, revealing the importance of the developing standard analysis techniques. The results also indicated that PMV overestimated the thermal sensation by the factors of 1.6–1.8, while PET and UTCI had stronger correlation with actual sensation votes. At the end, an empirical model was proposed for predicting thermal sensation in Tehran. The outcomes of this study showed that to design a sustainable and appropriate urban space in this climate, priorities should be given to the winter and summer seasons.

Keywords: Outdoor thermal comfort; Thermal sensation; Physiological Equivalent Temperature; Predicted Mean Vote; Universal Thermal Climate Index; BWk climate.

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