NONLINEAR ASSOCIATION OF DIURNAL TEMPERATURE RANGE WITH OXIDATIVE AND PHYSIOLOGIC STRESS MARKERS IN THE KOREAN ELDERLY ENVIRONMENTAL PANEL STUDY (KEEPS)

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Background and Aims: While diurnal temperature range (DTR) has been found to be a risk factor for mortality in a previous study with an assumption of linearity, some disease mortality, such as that associated with rheumatic heart disease (RHD), showed a threshold effect for DTR. To define the nonlinear relationship pathway between DTR and health effects, we investigated how physiologic and oxidative stress markers responded to DTR.
Methods: This study was part of the Korean Elderly Environmental Panel Study (KEEPS). Data was obtained from 569 participants who regularly attended a community elderly care center located in Seoul, Korea. The study was conducted a total of five times over a three years period beginning in August, 2008. We examined physiologic stress markers including heart rate variability (HRV) and indices such as mean heart rate, standard deviation of normal-to-normal (SDNN), normalized low frequency (LF) and high frequency (HF), and low/high frequency ratio (LF:HF). Urinary malondialdehyde (MDA) was evaluated as an oxidative stress marker. Effects of DTR below or above the median level were estimated using a generalized linear mixed model.
Results: Significant differences in effects of DTR above and below the median level indicated the presence of a threshold effect or a nonlinear association between DTR and HRV markers. Estimated effects for log-transformed SDNN were 0.211 (standard error [SE] 0.069, *P* =0.0021) below and -0.093 (SE 0.038, *P* =0.0129) above the median DTR. While the mean heart rate slope above median DTR was significant, slopes of normalized HF and LF:HF ratio below median DTR were statistically significant. In addition, log-transformed MDA showed a pattern similar to HRV indices.
Conclusions: The study demonstrated that physiologic and oxidative stress increased at low and high DTR with minimal stress levels around the median level of DTR indicating a physiologic comfort point.

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