Comparison of Heat and Cold Stress Effects on Cardiovascular Mortality and Morbidity in Central European Urban and Rural Populations.

J. Kyncl, PhD1,2, A. Urban, MS3,4, J. Kysely, PhD3, H. Davidkovova, MS3,4 and B. Kriz, PhD1,2
1National Institute of Public Health, Prague 10, Czech Republic, 2Third Faculty of Medicine, Charles University in Prague, Prague 10, Czech Republic, 3AS CR, Prague 4, Czech Republic, 4Faculty of Science, Charles University in Prague, Prague 2, Czech Republic

INTRODUCTION: There have been several studies on relationships of high and low air temperatures with excess cardiovascular mortality in the Czech Republic. Much less has been understood about heat/cold-related cardiovascular morbidity in this region.

METHODS: Differences in the impacts of warm and cold days on excess mortality and hospitalizations were compared for individual cardiovascular diseases (CVDs) in urban and rural regions over the period 1994–2009. These differences are compared between selected population groups (men and women). Values of the 90% (10%) percentile of daily mean air temperature in summer (winter) were used for the definition of warm (cold) days for each region separately. The excess mortality and morbidity were determined as differences from standardized daily counts of death and hospital admissions, adjusted for influenza epidemics and for annual and weekly cycles of mortality and hospitalizations.

RESULTS: Generally higher relative excess CVD mortality on warm days was identified in Prague, while for cold days we found higher excess mortality in south Bohemia. In contrast to mortality, weak excess CVD hospitalizations were observed for both warm and cold days. Significant \( P = 0.05 \) excess hospitalizations were observed for chronic CVDs. Different responses of individual CVDs to heat/cold stress were observed, which are probably caused by the different nature of each CVD and different physiological processes induced by high/low ambient temperatures.

CONCLUSIONS: The results suggest that excess deaths during hot spells are mainly of elderly people with chronic diseases whose health has been compromised before a hot spell. On the contrary, cardiovascular changes induced by cold stress could result in deaths from acute coronary events, and this effect is important also in the younger population. The regional differences indicate a possible influence of other factors, such as exposure to air pollution, different lifestyle, or different population structure in education or employment in urban/rural regions. Supported by the Czech Science Foundation under project P209/11/1985.