

Effects of temperature extremes on hospital admissions for cardiovascular diseases

The thesis compares differences in the impacts of warm and cold days on both excess mortality and hospitalizations for individual cardiovascular diseases (CVDs) in Prague and a selected rural region (southern Bohemia – JČ) consisting of the *Jihočeský kraj* and *Vysočina* districts in the period 1994–2009. Population size and age structure are similar in the two regions. The differences are compared between selected population groups (men and women; < 65 and 65+ years). Value of the 90% (10%) percentile of daily mean air temperature in summer (winter) during the period were used for the definition of warm (cold) days for each region separately. The excess mortality and hospitalizations were determined as the difference from standardized daily counts of death and hospital admissions, adjusted for the epidemics of influenza/acute respiratory infections, and for annual and weekly cycles of mortality and hospitalizations.

In Prague on warm days, we observed a significant ($p = 0.05$) excess mortality for CVD as a whole as well as for individual diagnoses, in more population groups than in the JČ region. The highest relative excess mortality on warm days in Prague was identified for women with chronic ischemic heart disease and for men with atherosclerosis (both < 65 years). On cold days, the highest excess mortality was found for women < 65 years with myocardial infarction in the JČ region. For aggregate groups of ischemic heart diseases and cerebrovascular diseases, a significant excess mortality in both regions and on both warm and cold days was identified.

In contrast to mortality, weak impact of warm and cold days on excess hospitalizations for CVD was observed. Significant ($p = 0.05$) excess hospitalizations were observed particularly for chronic CVD. In Prague, the risk involved especially men ≥ 65 years (+16.5%) in cases of hospital admissions for phlebitis and thrombophlebitis on cold days and women ≥ 65 years (+8.6%) in cases of atherosclerosis on warm days. In the JČ region, significant excess hospitalizations (+5.7%) on cold days for men with chronic ischemic heart disease were revealed.

The different responses of individual CVD to heat/cold stress are probably caused by the different nature of each CVD and different physiological processes induced by high/low ambient temperatures. The regional differences between Prague and the JČ region indicate influence of other factors such as prolonged exposure to air pollution, a different lifestyle, or a different structure of the population (e.g. in education, employment) in urban/rural regions, which may result in different vulnerability to temperature extremes.

Keywords: hospital admission, morbidity, mortality, cardiovascular disease, heat and cold stress, urban and rural differences, Czech Republic