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Effects of hot and cold spells on coronary heart disease mortality and morbidity in the Czech Republic

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Epidemiological research has shown that both hot and cold weather extremes are associated with increases in cardiovascular mortality, but little is known about the effects of extreme temperatures on cause-specific mortality and morbidity related to cardiovascular disorders. This study analyses the effects of hot and cold spells on coronary heart disease mortality and morbidity, with focus on acute myocardial infarction and chronic ischemic heart disease.

We make use of datasets on daily mortality and morbidity (hospital admissions) for coronary heart disease (I20-I25) in the population of the Czech Republic over 1994-2009. The data have been standardised to remove the effects of the long-term trend and the seasonal and weekly cycles. Periods when the data were affected by epidemics of influenza and other acute respiratory infections were removed from the analysis. The data were stratified by gender and divided into main age groups (0-64, 65+ years). We use analogous definitions for hot and cold spells based on quantiles of daily average temperature anomalies, which allows for a comparison of the findings for summer hot spells and winter cold spells (cf. Kyselý et al., 2011).

Both hot and cold spells were associated with excess coronary heart disease mortality while their effects on morbidity were weak. During hot spells, chronic ischemic heart disease was predominantly responsible for most coronary heart disease excess deaths in both male and female population. The excess mortality from acute myocardial infarction was much lower compared to chronic ischemic heart disease mortality. In cold spells, the excess mortality for coronary heart disease was most pronounced in younger age group (0-64 years), and a different pattern for chronic and acute coronary heart diseases was found. The effect of low temperatures was immediate and persisted several days after the onset of a cold spell, while heat-related mortality occurred with a lag of one day after the onset of a hot spell.

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.

Kyselý J, Plavcová E, Davídkovová H, Kynčl J (2011) Comparison of hot and cold spell effects on cardiovascular mortality in individual population groups in the Czech Republic. Clim Res 49:113-129