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Seasonal variations of myocardial infarction and sex-specific differences in Germany

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Background

Ischemic heart disease (IHD) is the most common cause of death with an increasing frequency worldwide. It accounts for approximately 20% of all deaths in Europe and the United States of America. Approximately 1/3 of the IHD patients present with sudden cardiac death. The acute presentation of IHD myocardial infarction (MI) is a life-threatening, serious health problem, which causes substantially morbidity and mortality. It is well established that the onset of MI follows a circadian and seasonal periodicity. Seasonal variation regarding the incidence and the short-term mortality of acute MI was frequently reported, but data about sex-specific differences are sparse.

Purpose

Thus, our objectives were to investigate seasonal variations of myocardial infarction.

Methods

We analyzed the impact of seasons on incidence and in-hospital mortality of patients with acute MI in Germany from 2005 to 2015. We included all MI patients (ICD code I21) with an acute MI (but not those MI patients with a recurrent event in the first 28 days after a previous MI (ICD code I22)), who were hospitalized in Germany between 2005 and 2015, in this analysis (source: RDC of the Federal Statistical Office and the Statistical Offices of the federal states, DRG Statistics 2005-2015, own calculations).

Results

The nationwide sample comprised 3,008,188 hospitalizations of patients with MI (2005-2015). The annual incidence was 334.7 per 100,000 population. Incidence inclined from 316.3 to 341.6 per 100,000 population per year (β 0.17 [0.10 to 0.24], P<0.001), while in-hospital mortality rate decreased from 14.1% to 11.3% (β -0.29 [-0.30 to -0.28, P<0.001). Overall, 377,028 (12.5%) patients died in-hospital.

Seasonal variation of both incidence and in-hospital mortality were of substantial magnitude. Seasonal incidence (86.1 vs. 79.0 per 100,000 population per year, P<0.001) and in-hospital mortality (13.2% vs. 12.1%, P<0.001) were higher in the winter than in the summer season. Risk to die in winter was elevated (OR 1.080 (95%CI 1.069-1.091), P<0.001) compared to summer season independently of sex, age and comorbidities. Reperfusion treatment with drug eluting stents and coronary artery bypass graft were more often used in summer.
We observed sex-specific differences regarding the seasonal variation of in-hospital mortality: males showed lowest mortality in summer, while females during fall. Low temperature dependency of mortality seems more pronounced in males.

Conclusions
Incidence of acute MI increased 2005-2015, while in-hospital mortality rate decreased. Seasonal variations of incidence and in-hospital mortality were of substantial magnitude with lowest incidence and lowest mortality in the summer season. Additionally, we observed sex-specific differences regarding the seasonal variation of the in-hospital mortality.