



Relationship between Season and Acute Myocardial Infarction, In Iran

Cardiovascular disease (CVD) is the most common cause of death in Iran.¹ There has been an increasing trend in the proportional mortality rate since 1981. In 1995, 47.3% of all deaths were due to CVD. According to the first national burden of disease study for the year 2003, the third highest disability-adjusted life year (DALY) in all ages and both sexes (16% of total burden) was attributed to this disease and it accounted for one billion years of life lost (YLLs) due to premature mortality and 500 thousand years lived with disability (YLDs).² Seasonal variation in admissions and mortality due to acute myocardial infarction (AMI) has been observed in different countries.³⁻⁶ Most studies suggest that the highest and lowest rates of the occurrence of AMI resulting in hospital admission and mortality are observed during winter⁵⁻⁷ and summer,^{6, 7} respectively. Likewise in Iran, according to the results of the author's study, the lowest hospital admission rate for AMI was seen during summer and the highest during spring and winter: the rates increased by 17.8%, 15.8%, and 4.2% during spring, winter, and autumn, respectively, compared to the summer rate. Also, the highest mortality rate was in winter and the lowest in autumn.⁸ In a study conducted by Vasconcelos et al.⁹ in Portugal, a negative outcome of cold weather conditions on AMI was observed insofar as for every degree decrease in physiological equivalent temperature (PET) in winter, there was an increase of up to 2.2% (95% confidence interval: 0.9% - 3.3%) in day-by-day hospital admission rates. However, different explanations exist for the observed variation in hospital admission and mortality due to AMI in various parts of the world. For instance, Ornato et al.¹⁰ reviewed the results of other studies in this field and reported that numerous ideas have been offered to clarify the increased prevalence of AMI or its complications in the winter and cold season. A quick conversion in the weather can increase arterial blood pressure, blood viscosity, arterial spasm, plasma fibrinogen and factor VII, serum cholesterol levels, and platelet and red blood cell counts. Exposure to cold weather also has important hemodynamic effects, including a rise in systemic vascular resistance, myocardial oxygen intake, and metabolic rate. Contemporary infections

during the winter months, particularly those involving the respiratory tract, have also been claimed as a trigger for acute cardiovascular morbid events. Other mechanisms that have been proposed to describe the increase in cardiovascular events during cold weather include seasonal variation in bodily activity, food, weight, worry and stress in the holiday season, and seasonal variety in the secretion of physiologically active substances similar to those that trigger seasonal depression. Also, Ulmer et al.¹¹ concluded that cholesterol, blood pressure, and body mass index were seasonal variants that were significantly higher during winter than in the other seasons in all age groups and in both sexes. In contrast, there is also research that contradicts the aforementioned findings by demonstrating that the majority of AMI cases occur during spring.¹²

References

1. Khosravi A, Rao C, Naghavi M, Taylor R, Jafari N, Lopez AD. Impact of misclassification on measures of cardiovascular disease mortality in the Islamic Republic of Iran: a cross-sectional study. *Bull World Health Organ*. 2008;86:688-696.
2. Naghavi M, Abolhassani F, Pourmalek F, Lakeh M, Jafari N, Vaseghi S, Mahdavi Hezaveh N, Kazemeini H. The burden of disease and injury in Iran 2003. *Popul Health Metr* 2009;7:9.
3. Loughnan ME, Nicholls N, Tapper NJ. Demographic, seasonal, and spatial differences in acute myocardial infarction admissions to hospital in Melbourne Australia. *Int J Health Geogr* 2008;7:42.
4. Kriszbacher I, Bódis J, Csoboth I, Boncz I. The occurrence of acute myocardial infarction in relation to weather conditions. *Int J Cardiol* 2009;135:136-138.
5. Rumana N, Kita Y, Turin TC, Murakami Y, Sugihara H, Morita Y, Tomioka N, Okayama A, Nakamura Y, Ueshima H. Seasonal pattern of incidence and case fatality of acute myocardial infarction in a Japanese population (from the Takashima AMI Registry, 1988 to 2003). *Am J Cardiol* 2008;102:1307-1311.
6. Dilaveris P, Synetos A, Giannopoulos G, Gialafos E, Pantazis A, Stefanadis C. CLimate Impacts on Myocardial infarction deaths in the Athens Territory: the CLIMATE study. *Heart* 2006;92:1747-1751.
7. Stewart S, McIntyre K, Capewell S, McMurray JJ. Heart failure in a cold climate. Seasonal variation in heart failure-related morbidity and mortality. *J Am Coll Cardiol* 2002;39:760-766.
8. Mohammadian-Hafshejani A, Sarrafzadegan N, Hosseini S, Baradaran HR, Roohafza H, Sadeghi M, Asadi-Lari M. Seasonal pattern in admissions and mortality from acute myocardial infarction in elderly patients in Isfahan, Iran. *ARYA Atheroscler* 2014;10:46-54.
9. Vasconcelos J, Freire E, Almendra R, Silva GL, Santana P. The impact of winter cold weather on acute myocardial infarctions in Portugal. *Environ Pollut* 2013;183:14-18.
10. Ornato JP, Peberdy MA, Chandra NC, Bush DE. Seasonal pattern of acute myocardial infarction in the National Registry of Myocardial Infarction. *J Am Coll Cardiol* 1996;28:1684-1688.
11. Ulmer H, Kelleher C, Diem G, Concin H, Ruttman E. Estimation of seasonal variations in risk factor profiles and



mortality from coronary heart disease. *Wien Klin Wochenschr* 2004;116:662-668.

12. González Hernández E, Cabadés O'Callaghan A, Cebrián Doménech J, López Merino V, Sanjuán Mañez R, Echánove Errazti I, Valencia Martín J, Bertomeu Martínez V; Investigadores del estudio PRIMVAC. Seasonal variations in admissions for acute myocardial infarction. The PRIMVAC study. *Rev Esp Cardiol* 2004;57:12-19.

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