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Do meteorological factors influence the occurrence of acute aortic dissection? A ten-year retrospective institutional review

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Purpose:
Some studies have reported a relationship between meteorological factors and the occurrence of acute aortic dissection (AAD). Nevertheless, the results of the studies are heterogeneous. Furthermore, whether the absolute values or fluctuation of meteorological factors influence the occurrence of AAD remains controversial. The aim of this study was to determine the meteorological factors associated with the occurrence of AAD.

Methods:
Two hundred eighty-two consecutive patients (male, n=178; female, n=104; average age, 68 years) admitted to our hospital for AAD in the 10 years from September 1st 2008 were included in this study. One hundred fifty-seven patients had type A dissection. The correlation between the clinical data and the local meteorological data over the same period (provided by the National Meteorological Agency) was analyzed. We compared the following factors on days of AAD occurrence and non-occurrence: minimum and maximum temperature, minimum and maximum temperature difference between day of occurrence and previous day, difference between maximum and minimum temperature, atmospheric pressure, and atmospheric pressure difference between day of occurrence and previous day (atmospheric pressure), and minimum and maximum temperature difference from climatological standard normal (CSN). Cutoff values were determined by ROC curve analyses and odds ratios (ORs) were calculated by a logistic regression analysis of meteorological factors with statistically significant differences.

Results:
Significant differences between the days of AAD occurrence and non-occurrence were observed for minimum and maximum temperature (p<0.0001), atmospheric pressure (p<0.0001) and atmospheric pressure (p=0.0286), minimum temperature difference from CSN (p<0.0001), and maximum temperature difference from CSN (p=0.0010).

The cutoff values were as follows: minimum temperature, 4°C; maximum temperature, 15.1°C; atmospheric pressure, 1008.9 hPa; atmospheric pressure, 0.4 hPa; minimum temperature difference from CSN, 1°C; and maximum temperature difference from CSN, -0.2°C.

The univariate logistic regression model showed revealed the following significant predictors of the occurrence of AAD; minimum temperature (OR 2.42, p<0.0001), maximum temperature (OR 2.23, p<0.0001), air pressure (OR 1.75, p<0.0001), atmospheric pressure (OR 1.44, p=0.0030), minimum temperature difference from CSN (OR 1.80, p<0.0001) and maximum temperature difference from CSN (OR 1.58, p=0.0003). However, only minimum temperature (OR 1.60, 95% CI 1.00-2.53, p=0.0478) and maximum temperature difference from CSN (OR 1.45, 95% CI 1.11-1.89, p=0.0062) remained significant in the multivariate analysis.

Conclusion:
Meteorological factors, especially a minimum temperature under 4°C strongly influenced the occurrence of AAD. A maximum temperature difference from CSN of over -0.2°C was also a significant predictor of AAD.