

# Common air pollutants linked with increased risk of cardiac arrest

August 27 2021

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A study in Italy has identified a dose-response relationship between the concentration of everyday pollutants and the incidence of out-of-hospital cardiac arrest. The research is presented at ESC Congress 2021.

"We studied seven common pollutants and found that as the concentration of each rose, the risk of cardiac [arrest](#) increased," said

study author Dr. Francesca R. Gentile of the IRCCS Policlinico San Matteo Foundation, Pavia, Italy. "The findings suggest that air quality should be incorporated into predictive models to assist [health systems](#) in planning service requirements."

Air pollution has been established as a potential trigger for out-of-hospital cardiac arrest but the relationship with specific air pollutants remains controversial because of the number of mechanisms involved. This study examined the associations between short-term exposure to particulate and gaseous pollutants and the incidence of out-of-hospital cardiac arrest.

The study was conducted in the provinces of Pavia, Lodi, Cremona and Mantua in southern Lombardy, which cover 7,863 km<sup>2</sup> across metropolitan and rural areas with more than 1.5 million inhabitants. Data on the daily incidence of cardiac arrest in 2019 were obtained from the regional cardiac arrest registry Lombardia CARE. Information on daily concentrations of particulate matter (PM10, PM2.5), nitrogen dioxide, carbon monoxide, benzene, sulphur dioxide and ozone across the study territory were provided by the regional agency for environmental protection (ARPA).

The authors calculated the median daily incidence of cardiac arrest in 2019, then classified each day as higher or lower incidence than the median value. Using the concentration values provided by monitoring stations across the study territory, the authors computed the mean daily concentration of pollutants.

A total of 1,582 out-of-hospital cardiac arrests occurred in the study region during 2019, with a median daily incidence of 0.3 cases per 100,000 inhabitants. The concentrations of PM10, PM2.5, [nitrogen dioxide](#), [carbon monoxide](#), benzene, and [sulphur dioxide](#) were significantly higher on days with a cardiac arrest incidence above the

median, compared to days when incidence was below the median. In the initial analysis ozone showed a countertrend, being at significantly higher concentration in the low-incidence period.

The researchers then evaluated the relationship between the concentration (or dose) of each [pollutant](#) and the probability of having an incidence of cardiac arrest over the median value. After correcting for the average daily temperature, a dose-response relationship was demonstrated for all the tested pollutants, including ozone, where a rise in concentration was associated with a higher probability of cardiac arrest. An inverse relationship was found for temperature, with the probability of cardiac arrest rising as temperature dropped.

Dr. Gentile said: "The observed relationships between concentrations of individual pollutants and the likelihood of cardiac arrest could be used in future to predict the incidence of this life-threatening condition in specific geographical areas. We hope that air pollutant monitoring can improve health service efficiency by being factored into ambulance forecasting models and warning systems. In addition to being a threat to the ecosystem, evidence is accumulating that dirty air should be considered a modifiable factor that contributes to cardiovascular disease."

**More information:** Abstract title: Out-of-hospital cardiac arrest and ambient air pollution: a dose-effect relationship and a predictive role in OHCA risk.

Provided by European Society of Cardiology

Citation: Common air pollutants linked with increased risk of cardiac arrest (2021, August 27) retrieved 19 September 2024 from

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