

The relationship between ambient particulate matter and respiratory mortality: a multi-city study in Italy

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ABSTRACT: The association of air pollutants with natural and respiratory mortality has been consistently reported. However, several aspects of the relationship between particulate matter with a 50% cut-off aerodynamic diameter of 10 μm (PM₁₀) and respiratory mortality require further investigation. The aim of the present study was to assess the PM₁₀–respiratory mortality association in Italy and examine potentially susceptible groups.

All deaths from natural (n=276,205) and respiratory (n=19,629) causes among subjects aged ≥ 35 yrs in 10 northern, central and southern Italian cities in 2001–2005 were included in the study. Pollution data for PM₁₀, nitrogen dioxide and ozone were also obtained. A time-stratified case-crossover analysis was carried out. Different cumulative lags were selected to analyse immediate, delayed, prolonged and best-time effects of air pollution. The shape of the exposure–response curve was analysed. Age, sex, chronic conditions and death site were investigated as potential effect modifiers.

We found a 2.29% (95% CI 1.03–3.58%) increase in respiratory mortality at 0–3 days lag. The increase in respiratory mortality was higher in summer (7.57%). The exposure–response curve had a linear shape without any threshold. Sex and chronic diseases modified the relationship between particulate matter (PM) and respiratory mortality.

The effect of PM on respiratory mortality was stronger and more persistent than that on natural mortality. Females and chronic disease sufferers were more likely to die of a respiratory disease caused by air pollution than males and healthy people.

KEYWORDS: Case-crossover design, multi-city study, particulate matter, respiratory mortality