PM2.5 levels strongly associate with multiple sclerosis prevalence in the Province of Padua, Veneto Region, North-East Italy

Fabio Tateo [1], Francesca Grassivaro [2], Mario Ermani [3], Marco Puthenparampil [2], Paolo Gallo [2]

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1 Institute of Geosciences and Earth Resources, National Research Council of Italy, Department of Geosciences, Università degli Studi di Padova, Padova, Italy.
2 Multiple Sclerosis Centre, Department of Neurosciences (DNS), Università degli Studi di Padova, Padova, Italy.
3 Department of Neurosciences (DNS), Università degli Studi di Padova, Padova, Italy.

Abstract

Background: Incidence and prevalence trends of multiple sclerosis (MS) in the Province of Padua, North-East Italy, suggest that environmental factors may be associated with increased MS risk.

Objective: To investigate the association of PM2.5 with MS prevalence in one of the most polluted geographical area of Italy.

Methods: In total, 1435 Italian MS patients residing in the Province of Padua were enrolled. The province surface was classified into urban areas, isolated villages, industrialized places, and countryside. Satellite-derived dust-free and sea salt-free PM2.5 concentrations (annual average 1998-2015, $\mu g/m^3$) allowed the identification of 18 classes of territorial sections with statistically evaluable numbers of inhabitants. Possible correlations between residential locality types, PM2.5 concentrations, and MS prevalence were investigated.

Results: MS prevalence was significantly ($p < 0.0001$) higher in urban areas (ranging from 219 in Padua City to 169/100,000 in other urban areas) compared to isolated villages (116/100,000) or rural domains (109/100,000) and strongly correlated with the annual average concentration of PM2.5 ($r = 0.81$, $p < 0.001$). Regression analysis further associated MS cases with PM.2.5 average concentration ($\beta = 0.11$, $p < 0.001$).

Conclusion: In the Province of Padua, MS prevalence is strongly associated with PM2.5 exposure suggesting that air pollutants may be one of the possible environmental risk factors for MS.