

# Long-term particulate matter pollution is associated with high blood pressure

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According to the WHO, air pollution is the greatest health risk worldwide, accounting for more than 4.2 million deaths annually. In addition, chronic exposure to particulate matter contributes to the risk of

cardiovascular and respiratory diseases, and in particular has been associated with high blood pressure, according to a study published in *Scientific Reports* by the Biomedical Research Networking Centre in Diabetes and Associated Metabolic Disorders (CIBERDEM) and the Biomedical Research Institute of Málaga (IBIMA).

The study by Gemma Rojo's team has assessed the impact of particulate [pollution](#) on the long-term incidence of hypertension in Spain, supporting the need to improve air quality to the extent possible in order to reduce the risk of cardiometabolic diseases among the population.

To this end, CIBERDEM researchers have carried out a study, di@bet.es, where 1103 people aged between 18 and 83 took part. None of the participants presented high [blood pressure](#) hypertension at the start of the study (2008-2010), and they were monitored until 2016-17. The cohort participants were assigned [air pollution](#) concentrations for particulate matter, obtained through combined modeling, with measurements taken at air quality stations. During this period, 282 cases of incident high blood pressure were recorded.

The study has been carried out in collaboration with the air pollution department of the Research Centre for Energy, Environment and Technology (CIEMAT).

As explained by Sergio Valdés, CIBERDEM researcher at the IBIMA and endocrinologist at Hospital Regional Universitario de Málaga, "Several previous studies have described the short- and long-term association of ambient air pollutants with hypertension and [blood pressure levels](#), but few studies have addressed the association between long-term exposure to these particles and the incidence of hypertension in a prospective manner. Therefore, the di@bet.es study has offered us the opportunity to do so in the Spanish population".

During the study phases, the participants underwent a medical examination at a health center and blood samples were taken. In addition, a questionnaire was used to obtain information on age, sex, educational level, ethnicity, smoking, alcohol consumption and other variables. Food consumption was determined using a Mediterranean diet adherence questionnaire, the level of physical exercise was analyzed and BMI was calculated. Blood pressure was measured with a blood pressure monitor and it was determined as hypertension if the mean systolic blood pressure was greater than or equal to 140 mmHg and/or if the mean diastolic blood pressure was greater than or equal to 90 mmHg.

## **The greatest threat to the cardiovascular system**

Gemma Rojo, head of the CIBERDEM group at the IBIMA and final signatory of the study, states that "our data is consistent with a large body of evidence suggesting that air pollution may contribute to the pathogenesis of hypertension. It also supports the idea that the particulate component of air pollution is the greatest threat to the cardiovascular system."

In this regard, she states, "Although previous associations between exposure to gaseous pollutants and [hypertension](#) have shown some discrepancies, most studies reporting long-term exposure to [particulate matter](#) and incident high blood pressure have reported positive associations consistent with our findings."

In short, the CIBERDEM study contributes to assessing the impact of particulate pollution on the incidence of high [blood pressure](#) in Spain and, as Sergio Valdés explains, "our results support the need to improve air quality to the extent possible in order to reduce the risk of [high blood pressure](#) among our population, as even moderate levels such as those we report here increase the risk significantly."

**More information:** Viyey Doulatram-Gamgaram et al, Association between long term exposure to particulate matter and incident hypertension in Spain, *Scientific Reports* (2021). [DOI: 10.1038/s41598-021-99154-7](https://doi.org/10.1038/s41598-021-99154-7)

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