

Air pollution does not increase the risk of getting infected but does increase the risk of getting sick from COVID-19

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Long-term exposure to air pollution is associated with a higher risk of developing COVID-19 among those people who get infected, shows a

study led by the Barcelona Institute of Global Health (ISGlobal), a center supported by the "la Caixa" Foundation, and co-led by the GCAT| Genomes for Life-Germans Trias i Pujol Research Institute (IGTP), Badalona. The study, published in *Environment Health Perspectives*, provides further evidence on the health benefits of reducing air pollution.

A series of studies suggest that regions with higher pre-pandemic levels of [air pollution](#) had a higher incidence of COVID-19 cases and deaths. However, the reasons for this associations are not yet clear; air pollution could favor airborne transmission of the virus, or it could increase an individual's susceptibility to infection or disease. "The problem is that previous studies were based on reported cases, which had been diagnosed, but missed all the asymptomatic or undiagnosed cases," says Manolis Kogevinas, ISGlobal researcher and first author of the study.

The research team decided to combine the technology developed by Carlota Dobaño's team to measure a series of virus-specific antibodies in a cohort of adults living in Catalonia (the COVICAT cohort), with information on the long-term exposure of such individuals to air pollutants (NO₂, PM_{2.5}, black carbon and ozone).

"This is the first study to perform mass screening of SARS-CoV-2 specific antibodies in an adult cohort to examine the association between their residential exposure to air pollution before the pandemic, SARS-CoV-2 infection, and disease," says Cathryn Tonne, cosenior author of the study together with Dobaño.

Higher viral burden and/or symptom severity

The study included 9,605 participants among which there were 481 confirmed cases (5%). In addition, blood samples from over 4,000 participants were taken to determine the presence and quantity of IgM,

IgA and IgG antibodies to five viral antigens. Of these, 18% had virus-specific antibodies, but no association was found between infection and exposure to air pollutants. However, among those who were seropositive (i.e. got infected), an association was found between higher exposure to NO₂ and PM_{2.5} and higher levels of IgG specific for the five viral antigens (an indication of higher viral burden and/or symptom severity).

For the total study population (the 9,605 participants), an association was found between higher exposure to NO₂ and PM_{2.5} and disease (symptoms), particularly for severe cases that ended in the hospital or in intensive care. The association with PM_{2.5} was stronger for men over 60 years of age and people living in socioeconomically deprived areas.

Strongest evidence globally

"Our [study](#) provides the strongest evidence globally on the association of ambient air pollution and COVID-19," says Kogevinas. "These results are in line with the association between air pollution and hospitalization described for other respiratory diseases such as influenza or pneumonia." Air pollution could also contribute by favoring the development of cardiovascular, respiratory or other chronic conditions, which in turn increase the risk of severe COVID-19.

"The combination of individual genetic risks that we have previously identified in COVICAT individuals and this new data on environmental impact caused by air pollution exposure will contribute to understanding the complex interplay and mechanisms underlying the severity of COVID-19," says Rafael de Cid, from the IGTP.

The authors conclude that the results provide additional support for the public health benefits of reducing air [pollution](#) levels, and highlight the influence of environmental factors on infectious diseases.

More information: Manolis Kogevinas et al, Ambient Air Pollution in Relation to SARS-CoV-2 Infection, Antibody Response, and COVID-19 Disease: A Cohort Study in Catalonia, Spain (COVICAT Study), *Environmental Health Perspectives* (2021). [DOI: 10.1289/EHP9726](https://doi.org/10.1289/EHP9726)

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