

Exposure to air pollution may worsen autism-related hospital admissions in children

Boys more at risk than girls; cutting air pollutant levels could lower risks, say researchers

Autistic children seem to be at heightened risk of being admitted to hospital if they are exposed to air pollution for relatively brief periods, with boys more at risk than girls, suggests research published in the open access journal **BMJ Open**.

Admissions for issues such as hyperactivity, aggression, or self-injury might be prevented by minimising these children's exposure to air pollution, suggest the Korean researchers.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder with a range of symptoms and severity. It is often accompanied by neuroinflammation and systemic inflammation meaning drugs, supplements, and diet can improve the core symptoms.

It is believed that short-term exposure to air pollution (days to weeks) can induce systemic inflammation and neuroinflammation, potentially increasing the risk of hospital admission in autistic people.

But previous air pollution studies have focused on the association between long-term exposure to air pollution (months to years) during pregnancy and early postnatal period and ASD development among children.

The researchers wanted to find out if short-term exposure might also pose a risk for aggravating ASD symptoms among school-aged children: a child's developing nervous system is more susceptible to environmental exposures than an adult's.

They drew on official government data on daily hospital admissions for autism among children aged 5 to 14 between 2011 and 2015.

And they collected information on national daily levels of fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), and ozone (O₃) in each of the 16 regions in the Republic of Korea for up to six days.

The average daily number of hospital admissions for autism during the study period was 8.5 for autistic children and was much higher for boys (7) than for girls (1.6).

Analysis of the data showed that short-term exposure to PM_{2.5}, NO₂, and O₃ was associated with a heightened risk of hospital admission for autism, and that boys were at greater risk than girls.

A 10 $\mu\text{g}/\text{m}^3$ increase in $\text{PM}_{2.5}$ levels was associated with a 17% higher risk of hospital admission for autism, and a 10 parts per billion increase in NO_2 , and O_3 was associated with a 9% and 3% higher risk, respectively.

The researchers calculated that exposure to these pollutants was associated with a one-quartile increase (8.2 $\mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$, 6.7 ppb for NO_2 , and 11.3 ppb for O_3), which corresponds to a 29% higher risk of hospital admission for autism, with NO_2 exerting the strongest effects.

The researchers acknowledge that they used regional air pollution levels rather than individual ones, which could have affected their findings, and that autistic children with mild symptoms might be less likely to receive psychiatric treatment and so might not have been included.

Nevertheless, they point out that this is the first study to directly assess the effects of short-term exposure to air pollution on ASD-related health outcomes, and that all hospital admissions for ASD in Korean 5 to 14 year-olds were considered.

“This study suggests that short-term exposure to air pollution affects ASD symptom aggravation, which is more prominent among boys than among girls,” conclude the researchers.

They add: “These results emphasise that reduction of air pollution exposure should be considered for ASD symptom management, with important implications for the quality of life and economic costs.”