Children with asthma living in cities are especially vulnerable to urban pollution. Emissions from motor vehicles, in particular, are thought to provoke asthma-related symptoms. New research suggests that even ‘safe’ levels of atmospheric pollutants can affect children with asthma, causing breathing difficulties and an associated increase in health problems.

Researchers examined the relationship between daily concentrations of air pollutants and the prevalence of respiratory problems in a large sample of children with asthma living in seven inner-cities across America. Levels of the harmful pollutants nitrogen dioxide (NO₂), fine particulate matter less than 2.5 microns (PM₂.₅), sulfur dioxide (SO₂), ozone (O₃) and carbon monoxide (CO) were compared with lung function tests and respiratory symptoms associated with asthma, such as wheezing, waking at night, reduced play days and missed school days.

Despite the fact that the measured concentrations of air pollutants were almost all consistently below the limits set by the air quality regulations in America¹, the study found significant relationships between the incidence of breathing problems in children and their exposure to pollutants in the air. Children had considerably lower lung function tests when exposed to higher concentrations of NO₂, PM₂.₅ and SO₂, when these pollutants were measured as five-day averages, while raised levels of NO₂ and PM₂.₅ were associated with missed school days as a result of asthma. Raised NO₂ concentrations were also associated with respiratory symptoms. Taking medication for asthma and having cigarette smokers in the house did not affect these relationships, suggesting that the observed health problems were associated with outdoor urban air pollution.

NO₂ and PM₂.₅ concentrations can be used as surrogate measurements for motor vehicle exhaust emissions, because the majority of these emissions arise from vehicle exhaust. The association between reduced lung function and signs of respiratory-related symptoms with NO₂ concentrations suggests that motor vehicle emissions may have a significant impact on the health of children living in inner cities, by exacerbating breathing problems.

In addition, the study showed that five-day average pollution measurements of NO₂, PM₂.₅ and SO₂ were associated with reduced lung function, which was not seen with one-day exposure to raised pollutant levels. This suggests that adverse health effects were caused by prolonged exposure to the various pollutants, rather than one-off rises. Prolonged exposure may have a significant impact on the future health of children with asthma.

This study suggests that the effects of air pollution seen in children with asthma may cause long-term chronic problems as well as short-term acute difficulties. In particular, respiratory problems associated with higher levels of NO₂, which may be caused by motor vehicle emissions, could affect the long-term development of children with asthma. Policies that affect urban air quality could have a major impact on the health of children living in cities and suffering from asthma.

Additional information: For a comparison of EU air pollution policies and legislation with other countries, please download the following document: http://ec.europa.eu/enterprise/environment/reports_studies/reports/study1.pdf. Please note that this document was published in 2004. The New Air Quality Directive for the European Union was adopted on 14 April 2008, please see: http://ec.europa.eu/environment/air/quality/legislation/directive.htm


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