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**Traffic-related air pollution and risk of childhood leukemia: a meta-analysis
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Background and aims

Leukemia is the most frequent malignant disease affecting children. To date, the etiology of childhood leukemia remains largely unknown. Few risk factors (genetic susceptibility, infections, ionizing radiation, etc.) have been clearly identified, but they appear to explain only a small proportion of cases. Considerably more uncertain is the role of other environmental risk factors, such as indoor and outdoor air pollution. Here we reviewed and meta-analyzed the studies investigating the association between traffic-related air pollution and risk of childhood leukemia.

Methods

We carried out a PubMed up to June 2014, using as MeSH terms childhood leukemia, acute lymphoblastic leukemia, risk, air pollution, outdoor air pollution, and traffic. We identified nineteen case-control studies eligible for potential inclusion in the review. We assessed the risk of bias of these studies using the Newcastle Ottawa scale, and we reviewed the methodologies used to assess exposure to traffic-related air pollutants, such as the number of vehicles per day characterizing the roads close to subjects' residence, proximity to main roads, or the individual measured or modeled exposure to selected air contaminants.

Results

Depending on exposure assessment methodology, the meta-analysis yielded different overall odds ratios (OR), generally indicating an increased risk of childhood leukemia or specific subtypes of the disease, and these results were strengthened after removing studies at risk of selection bias. Summary ORs of the pooled analysis were 1.03 (95% Confidence Interval 0.99-1.06) for traffic density indicators, 1.29 (0.44-1.94) for nitrogen dioxide exposure, and 1.02 (0.28-1.76) for benzene exposure.

Conclusions

Despite the limitations of this meta-analysis, such as the differences in the assessment of exposure to outdoor air pollutants, the risk of confounding and the statistical imprecision of the point estimates, results of the study appear to suggest a direct association between traffic-related air pollution and risk of childhood leukemia.

Keywords: meta-analysis; outdoor air pollution; childhood leukemia; traffic