

The Association between Exposure to Air Pollution and Type 1 Diabetes Mellitus: A Systematic Review and Meta-Analysis

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Abstract

Background: This systematic review and meta-analysis aimed to overview the observational studies on the association of exposure to air pollution and type 1 diabetes mellitus (T1DM).

Materials and methods: Based on PRISMA guidelines, we systematically reviewed the databases of PubMed, Scopus, Embase, and Web of Science databases to determine the association of air pollution exposure and T1DM. Quality assessment of the papers was evaluated using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for observational studies. The odds ratios (OR) and their 95% confidence intervals (CI) were calculated to assess the strength of the associations between air pollutants (gases and particulate matter air pollutants including PM₁₀, PM_{2.5}, NO₂, volatile organic compound, SO₄, SO₂, O₃) and T1DM.

Results: Out of 385 initially identified papers, 6 studies were used for this meta-analysis. Fixed effects meta-analysis showed a significant association between per 10 µg/m³ increase in O₃ and PM_{2.5} exposures with the increased risk of T1DM (3 studies, OR = 1.51, 95% CI: 1.26, 1.80, *I*² = 83.5% for O₃ and two studies, OR = 1.03, 95% CI: 1.01, 1.05, *I*² = 76.3% for PM_{2.5}). There was no evidence of association between increased risk of T1DM and exposure to PM₁₀ (OR = 1.02, 95% CI: 0.99-1.06, *I*² = 59.4%), SO₄ (OR = 1.16, 95% CI: 0.91-1.49, *I*² = 93.8%), SO₂ (OR = 0.94, 95% CI: 0.83-1.06, *I*² = 85.0%), and NO₂ (OR = 0.995, 95% CI: 1.05-1.04, *I*² = 24.7%).

Conclusion: Recent publications indicated that exposure to ozone and PM_{2.5} may be a risk factor for T1DM. However, due to limited available studies, more prospective cohort studies are needed to clarify the role of air pollutants in T1DM occurrence.