

pollution on Alzheimer's disease: a systematic review

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Background

- Outdoor air pollution is a major global public health risk
- In 2019, outdoor air pollution caused 4.2 million premature deaths, with 99% of the global population exposed to air quality exceeding WHO guidelines (1)
- Neuroimaging has revealed the significant impact long-term exposure to air pollution can have on brain health e.g. cortical thinning
- Cortical thickness measures the width of the outer layer the brain (cortex)

Aim

Evaluate the effects of long-term exposure (months to years) to outdoor air pollution on the development of Alzheimer's disease (AD)-like brain changes.

Method

Four databases were searched on 20th June 2024: **MEDLINE**, **Scopus**, **CINAHL** and **Embase** for studies based on...



Alzheimer's Disease



Neuroimaging Techniques



Long-term exposure to outdoor air pollution

(sulfur dioxide, nitrogen dioxide (NO₂), ozone, particulate matter 2.5 or 10 (PM_{2.5}, PM₁₀), carbon monoxide)

Inclusion Criteria:

- Peer reviewed articles
- Published in English
- Articles from 2017 to present

Results

Total **458** articles retrieved

196 duplicates removed before screening

262 articles

154 excluded at title screening

71 excluded at abstract screening

27 removed at full text screening

10 included

- Exposure to NO₂ and PM₁₀ was associated with decreased cortical thickness
- These changes primarily occurred in brain regions susceptible to AD development
- Cognitive function tests e.g. Montreal Cognitive Assessment (MoCA) were used to assess cognitive ability
- However cortical thinning did not always coincide with the expected decline in cognitive function

Conclusion

- This review links NO₂ and PM₁₀ exposure with brain changes that could increase the risk of AD development
- These findings highlight the significant risk air pollution poses to brain health and the importance of restricting and regulating emissions of key air pollutants
- Further research is needed to confirm the relationship between reduced cortical thickness and cognition and whether outdoor air pollution should be classified as an AD risk factor.