The impact of outdoor air



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 longterm 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...







Inclusion Criteria:

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

Alzheimer's Disease

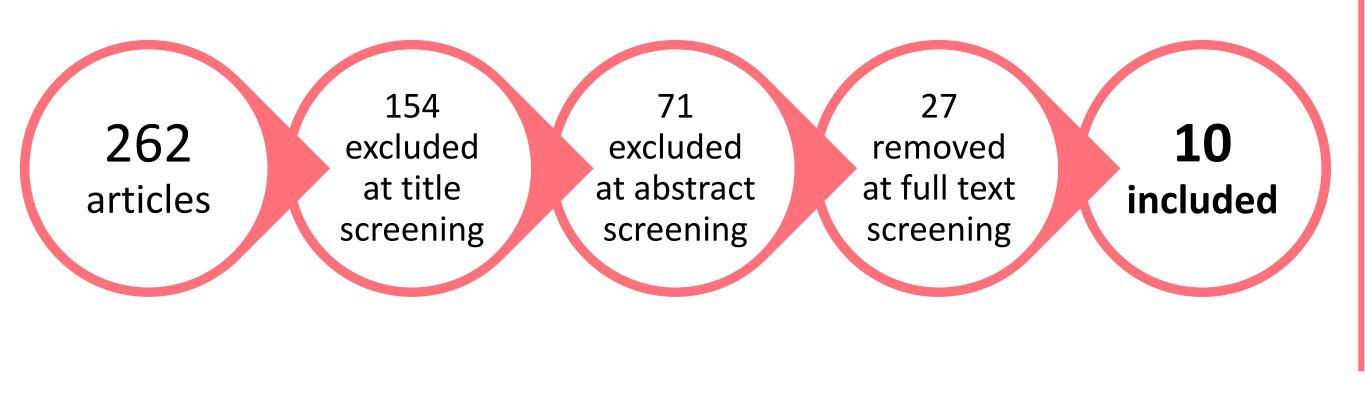
Neuroimaging Techniques

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)

Results

Total **458** articles retrieved **196** duplicates removed before screening



- 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.

References: (1) Ambient (outdoor) Air Pollution. World Health Organization; [cited 2024 Sep 18]. Available from: https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health