Associations between Particulate Matter Air Pollution, Presence and Progression of Subclinical Coronary and Carotid Atherosclerosis: A Systematic Review

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Introduction

- Long-term particulate matter (PM) exposure is associated with CVD and mortality
- Previous meta-analysis of studies until 2014 suggested a positive association between PM exposure and subclinical atherosclerosis, but results were not conclusive
- Aim of the study was to summarize and evaluate the quality of most updated evidence on the role of PM exposure in the development of subclinical CVD

Methods

- Systematic literature review using Embase and PubMed
- Studies looking at association between PM and exposure and subclinical atherosclerosis markers (CAC and CIMT) were included
- Quality of included studies was assessed using the Newcastle-Ottawa scale

Results

- 18 studies included; 5 cohort and 13 cross-sectional
- Included studies evaluated associations between CAC prevalence or difference, CAC progression, CIMT difference and CIMT progression in relation PM air pollution exposure
- All included studies were of good quality as determined by Newcastle-Ottawa scale

Discussion

- Majority of studies examined PM 2.5 which is the most studied PM in relation to adverse health effects
- Studies used various PM exposure estimation models; spatiotemporal models used in newer studies are more accurate
- Most studies adjusted for major confounders such as CVD risk factors, demographics and SES
- Overall, observational studies point toward positive association between air pollution and CAC and CIMT which are validated markers of subclinical atherosclerosis
- Studies reported association of CVD with PM 0.1, PM 2.5 and PM 10 and also with surrogates of air pollution such as traffic load and proximity to roads
- Longitudinal studies are limited but, contrary to previous data, newer studies report association between CAC progression and PM exposure
- A meta-analysis of included studies could not be performed due to marked heterogeneity in methods and measures of outcomes across studies

Conclusion

- Current evidence points towards association between PM exposure and subclinical atherosclerosis prevalence
- Limited date available for PM exposure and progression of subclinical atherosclerosis markers
- Longitudinal studies needed to further establish the link between air pollution and subclinical atherosclerosis, and understand underlying mechanisms