INPLASY

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Effects of air pollutants exposure on frailty risk: a systematic review and meta-analysis

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INTRODUCTION

*R*eview question / Objective What is the relationship between air pollution and frailty?

Condition being studied Frailty, a geriatric syndrome characterized by decreased physiological reserves and increased vulnerability, is emerging as one of the most studied clinical conditions in geriatrics due to its reversibility. Air pollution is known as a risk factor for several diseases typically in older adults, such as respiratory diseases and cardiovascular diseases, which are highly associated with frailty. Given this background, our purpose is to summarize the relationship between air pollution and frailty.

METHODS

Search strategy We have searched the following electronic bibliographic database from inception to May 11, 2024: PubMed, Web of Science, Embase, and Scopus. The primary search keywords were based on "air pollution" and "frailty". In "air pollution", we include the terms "air pollution", "air pollutants", "contaminated air" and so on. Keywords in "frailty" were "frail*" and "frail elderly". There will be no language restrictions. After removing duplicates, titles, abstracts, and full texts will be screened for eligibility by two authors. Any disagreement will be resolved by consensus with a third author or by discussion with the corresponding author.

Participant or population Studies conducted in human population without geographical restrictions.

Intervention Studies that focused on participants exposure to air pollutants.

Comparator Studies comparing individuals exposed to different levels of air pollutants.

Study designs to be included We will include both cohort studies and cross-sectional studies.

Eligibility criteria Exclusion criteria included irrelevant studies, review, conference, letter, book chapter, editorial material and studies whose effect sizes were not reported.

Information sources PubMed, Web of Science, Embase, and Scopus.

Main outcome(s) The association between exposure to air pollution and frailty risk (i.e., OR, RR, or HR).

Quality assessment / Risk of bias analysis Cohort study quality was assessed using Newcastle-Ottawa Scale (NOS) with overall NOS≥7 rating as high-quality. Cross-sectional study quality was assessed using an eight-item assessment instrument for epidemiological studies. Instrument criteria included the following: 1) Target population is clearly defined; 2) Probability or entire population sampling is used; 3) Response rate is >80%; 4) Non-responders are clearly described; 5) Sample is representative of the target population; 6) Data collection methods are standardized; 7) Validated criteria are used to assess the presence of frailty; 8) Estimates of prevalence are given with confidence intervals and detailed by subgroup (if applicable). Total scores ranged from 0 to 8 points. Studies with a total of 7–8 points were considered as 'high quality' while those with 4–6 points were of 'moderate quality' and those with 0–3 points were 'low quality.

Strategy of data synthesis Data analyses will be conducted with R; "meta" and "forestplot" modules will be used. Prevalence data will be converted using a Freeman–Tukey double-arcsine transformation. OR and 95% CI of frailty associated with exposure to target air pollutants will be calculated using fixed-effects model or random-effects model. The I2 statistic was used to evaluate study heterogeneity; values above 50% indicated high heterogeneity.

Subgroup analysis Subgroup analysis will be conducted based on categorial variables, such as geographic region, country income level, study design, male ratio, sample size, or other variables, if applicable.

Sensitivity analysis Sensitivity analysis will be performed by examining the reliability of results after excluding each study one by one, if applicable.

Country(ies) involved China.

Keywords Frailty, Particulate matter, Solid fuel, Meta-analysis.

Contributions of each author
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