INPLASY PROTOCOL

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None declared.

Association between PM2.5 pollution and outpatient visits for respiratory diseases in China: a systematic review and meta-analysis

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Review question / Objective: **Previous epidemiological studies on the association between PM2.5 pollution and outpatient visits for respiratory diseases in China were mostly limited to one region, and the different papers have no coherent results. Our objective is to perform a systematic review and meta-analysis of the relevant literature in order to summarize the association between PM2.5 pollution and outpatient visits for respiratory diseases in multiple cities in China.**
Condition being studied: **As an important component of air pollutants, particulate matter 2.5 (PM2.5) can float in the atmosphere for a long time with a small aerodynamic size (≤2.5μm) and large specific surface area which is attached to a variety of toxic and harmful substances . PM2.5 can deposite under the trachea of the respiratory tract, reaching deep into the alveolar area, damaging alveolar macrophages and type II alveolar epithelial cells, inducing alveolar inflammation, resulting in decreased immunity of the respiratory tract and interfering with normal physiological functions of the lungs.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 May 2022 and was last updated on 25 May 2022 (registration number INPLASY202250144).

INTRODUCTION

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METHODS

Search strategy: English and Chinese databases such as PubMed, EMBASE, Web of Science, CNKI and WanFang were searched using MeSH terms: "PM2.5", "particulate matter", "respiratory" and "outpatient visit". Literature tracing and manual retrieval were also used to collect relevant literature published from January 1, 2012 to March 1, 2022.

Participant or population: Outpatient visits for respiratory diseases in China.

Intervention: PM2.5 pollution.

Comparator: Population with no PM2.5 pollution.

Study designs to be included: The literature search, screening, and information extraction were all independently completed by two researchers. When there were doubts or contradictions, the decision was made after discussion or consultation with another author. All selected data were arranged as a standard data, including: the first author; year of publication; research period; city; age group; daily PM2.5 concentration; daily number of outpatient visits for respiratory diseases; lag-time; RR values and 95%CIs.

Eligibility criteria: Inclusion criteria were as follows. (1) The types of diseases studied were respiratory diseases (code J00-J99) in the 11th Revision of international Code of Diseases (ICD-11). (2) Studies that calculated or provided enough information to estimate the relative risk (RR) and it's 95% confidence interval (CIs) of respiratory outpatient visits associated with an increment of 10μg/m3 in PM2.5 concentrations in China. (3) The statistical analysis model established in literature is Poisson regression model of time series data and single pollutant effect model. (4) Meteorological data accurately reflect local pollution levels.Exclusion criteria were as follows. (1) Literature that does not conform to the above criteria. (2) The study area is not in China. (3) Case report, Reviews or Preclinical medicine research. (4) repeated research.

Information sources: PubMed, EMBASE, Web of Science, CNKI and WanFang databases. Literature tracing and manual retrieval.

Main outcome(s): Cochran's Q tests showed that I2=95.5% (P<0.05), therefore, we calculated the pooled RR using a random-effects model. The result showed that an increase of 10μg/m3 of PM2.5 corresponded to a RR of 1.0060 (95%CI: 1.0047,1.0073) for respiratory outpatient visits.

Quality assessment / Risk of bias analysis: Time series analysis was an observational study, so the Newcastle-Ottawa Scale (NOS) used in the non-randomized studies was used to evaluate the included literature. The full score was 10 points, studies that get >8 points were considered to be of high quality, 5-7 points matched the criteria of medium-quality studies and <5 points were considered to be poor-quality studies.

Strategy of data synthesis: The RR value of RD outpatient visits associated with an increment of 10μg/m3 in PM2.5 concentrations was used as the standard effect size. Stata 14.0 software was used to perform meta-analysis. The results were reported as pooled effect sizes with the corresponding 95%CI, and P 50%, P<0.05) and fixed-effects meta-analysis at small heterogeneity (I2<50%, P<0.05).

Subgroup analysis: In order to address potential confounding and reduce heterogeneity, we performed several subgroup analyses by lag-time, research groups and PM2.5 concentrations.

Sensitivity analysis: Sensitivity analysis was performed to evaluate the stability and reliability of the results. we repeated the analysis by leaving out each included study one by one to test its contribution to the pooled effect sizes. After excluding the literature data of Zhao Rong et al. I2 decreased from 95.5% to 89.7%, and RR changed from 1.0060 (95%CI:1.0047,1.0073) to 1.0049 (95%CI:1.0040,1.0059).

Country(ies) involved: China.

Keywords: PM2.5; Airpollution; Respiratory disease; Outpatient visit; Meta-analysis.

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