INPLASY PROTOCOL

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None declared.

Association between anticholinergic medication uses and the risk of pneumonia in elderly adults: a meta-analysis and systematic review

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Review question / Objective: **To conduct a meta-analysis and systematic review on the association between anticholinergic medication uses and the risk of pneumonia in elderly adults.**
Condition being studied: **Because of the widespread use of anticholinergic medication, several epidemiological studies have investigated the association between anticholinergic medication uses and the risk of pneumonia. These studies had been heterogeneous with regard to study design, methodologies, countries and the results were inconsistent. Overall, all of the previous investigations were observational cohort of case-control studies which lacked powerful statistical evidence to assess the relationship between the risk of pneumonia and anticholinergic medication. In the absence of randomized clinical trials, we therefore carried out present meta-analysis and systemic review to summarize the results of all existing studies and to ascertain the risk of pneumonia associated with exposure to anticholinergic medication uses.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 March 2023 and was last updated on 19 March 2023 (registration number INPLASY202330070).

INTRODUCTION

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METHODS

Search strategy: We performed a computerized and manual search by using the medical databases including PubMed, Web of science, EBSCO and Google Scholar from inception through December 7, 2022. To identify the literature, we used the following search term: ("anticholinergic drugs" OR "anticholinergic Medication" OR anticholinergics) and pneumonia. Meanwhile, we also checked the citations and bibliographies of included studies to identify any further pertinent studies.

Participant or population: Elderly adults who aged 65 or older.

Intervention: Not applicable.

Comparator: Exposure to anticholinergic medication use.

Study designs to be included: Case-control study, cohort study or randomized controlled trial.

Eligibility criteria: The studies were included if they fulfilled the following inclusion criteria: (I) study design: case-control study, cohort study or randomized controlled trial. (II) study investigate: the association between anticholinergic medication uses and the risk of pneumonia in elderly adults who aged 65 or older. (III) study data: results should be reported as adjusted odds ratio (aOR) or relative risk (aRR) and the corresponding 95% confidence interval (CI). (IV) study language: only written in English. Exclusion criteria: studies didn't have available data for outcome measures.

Information sources: We performed a computerized and manual search by using the medical databases including PubMed, Web of science, EBSCO and Google Scholar from inception through December 7, 2022. Meanwhile, we also checked the citations and bibliographies of included studies to identify any further pertinent studies.

Main outcome(s): A total of six studies with 107,012 subjects were included. Meta-analysis results showed that anticholinergic medication uses was related with an increased risk of pneumonia (aOR=1.59; 95%CI, 1.32-1.92;) and stroke-associated pneumonia (aOR=2.02; 95%CI, 1.76-2.33). Moreover, risk estimates of pneumonia for Anticholinergic Risk Scale (ARS)-high level anticholinergics (aOR=1.96; 95%CI, 1.22-3.14) were higher than those for ARS-low level anticholinergics (aOR=1.58; 95%CI, 1.27-1.97). And increased risk of pneumonia was associated with the anticholinergic medication uses within 30 days (aOR=2.13; 95%CI, 1.33-3.43), within 90 days (aOR=2.03; 95%CI, 1.26-3.26) and chronic use (aOR=1.65; 95%CI,1.09-2.51).

Quality assessment / Risk of bias analysis: Methodological quality of the included studies was evaluated by using Effective Public Health Practice Project tool (EPHPP) for quality assessment. The key component assessment included Selection bias, Study design, Confounders and Data collection methods. We derived the overall quality assessment as strong, moderate or weak according to each component assessment of no weak rating, one weak rating and two or more weak ratings. Egger's test and Begg's test were used to assess potential publication bias.

Strategy of data synthesis: We used aOR with 95%CI for the meta-analysis to assess the association between anticholinergic medication uses and the risk of pneumonia

in elderly adults. Heterogeneity across the included studies was identified by using the I2 statistic. I2 values of 25%, 50%, and 75% was assigned as low, moderate, and high heterogeneity, respectively. If I2>50%, the Random-effect meta-analysis was performed. All meta-analyses were conducted by using Stata/SE 12.0 (StataCorp, College Station, TX) and Review Manager version 5.3 (The Cochrane Collaboration, London, United Kingdom). The significance level was set at a P value of <0.05.

Subgroup analysis:
Meta-analysis: Anticholinergic medications and the risk of pneumonia.
Subgroup Meta-analyses
(I)Anticholinergic medications and the risk of stroke-associated pneumonia.
(II)ARS level of anticholinergic medications and the risk of pneumonia.
(III)Exposure periods of anticholinergic medications and the risk of pneumonia.

Sensitivity analysis: When high heterogeneity was found, sensitivity analysis would be conducted to determine which study contributed to the largest heterogeneity.

Language restriction: English.

Country(ies) involved: China (Department of Pulmonary and Critical Care Medicine, Shantou Central Hospital).

Keywords: Anticholinergic medication; pneumonia; elderly adults; meta-analysis; system review.

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