Review article

Risk factors of chronic obstructive pulmonary disease among adults in Chinese mainland: A systematic review and meta-analysis

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ABSTRACT

Background: Identifying risk factors is a key point for preventive strategies to reduce the incidence of COPD. The aim of this systematic review and meta-analysis was to determine the most important risk factors for COPD among adults in Chinese Mainland, so as to provide some precautions and interventions on this disease and preventing further recurrences.

Methods: A comprehensive literature review relating to risk factors for COPD through PubMed, EMBASE, Cochrane Library, China National Knowledge Infrastructure (CNKI), Wanfang database and VIP database was conducted before March 31, 2017. Odds ratio (OR) with 95% confidence interval (CI) was calculated after data combination to assess the associations between risk factors and COPD. Heterogeneity between the studies was assessed by I^2 and Cochran's Q test. Egger's test was used to assess publication bias.

Results: A total of 13893 participants (6383 cases and 7510 controls) from 19 case-controls studies were included. 12 risk factors with significant differences found between COPD and control groups were listed as follows: male sex (OR = 1.467; 95%CI: 1.097—1.962), smoking (OR = 2.092; 95%CI: 1.707—2.565), low educational level (OR = 1.609; 95%CI: 1.206—2.147), low BMI (OR = 3.831; 95%CI: 2.223—6.603), family history of respiratory disease (OR = 2.068; 95%CI: 1.466—2.918), allergy history (OR = 2.381; 95%CI: 1.385—4.093), respiratory infection during childhood (OR = 2.695; 95%CI: 1.504—4.828), recurrent respiratory infection (OR = 15.015; 95%CI: 4.538—49.684), occupational dust exposure (OR = 1.791; 95%CI: 1.151—2.788), biomass burning (OR = 2.218; 95%CI: 1.308—3.762), poor housing ventilation (OR = 3.993; 95% CI: 1.244—12.820), and living around polluted area (OR = 1.631; 95%CI: 1.202—2.214).

Conclusion: Twelve risk factors are associated with the occurrence of COPD in Chinese Mainland, which can be used to distinguish high-risk population. Health education and promotion campaigns should be designed in order to minimize or prevent the occurrence of COPD in Chinese Mainland.

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1. Introduction

Chronic obstructive pulmonary disease (COPD) is one of the common respiratory diseases, characterized by airflow limitation, which can be prevented and treated. The airflow limitation develops not fully reversibly and progressively [1]. According to the estimate of World Health Organization (WHO), about 3 million people died of COPD in 2005, which count for 5% of the total mortality worldwide. It is expected that by 2030, COPD will become the world's third largest lethal disease [2]. In a time of aging populations, COPD is becoming more and more serious, with high and increasing morbidity and mortality [1], especially in developing countries. In China, the overall prevalence of COPD in people older than 40 was 8.2% according to a large, population-based survey [3]. Because of the great impact on patients' health and quality of life, and high cost for the patients, their relatives, governments, and society, COPD has become an important public health problem in China [4].

Many human activities and environmental factors are associated with the incidence of COPD. A previous meta-analysis done by Zhang et al. [5] points out that seven factors may increase the risk of developing COPD, including smoking, occupational exposure and educational level, etc. Data from Chinese population are more convincing in health promotions and policy advocacies in China. In recent years, numerous epidemiological surveys have been conducted to identify the risk factors of COPD in various regions of China, but inconsistency has been presented among various study populations. On account of the demand for early detection of high-risk population, we operated this meta-analysis to investigate the overall risk factors of COPD in Chinese Mainland.

2. Methods

2.1. Search strategy and study selection

Two reviewers independently identified relevant studies published in English and Chinese before March 31, 2017 by searching the following electronic databases: PubMed, EMBASE, the Cochrane Library, China National Knowledge Infrastructure (CNKI), Wanfang database and VIP database. Following search terms were used: "Chronic Obstructive Pulmonary Disease" or "COPD" in combination with "risk factors". References cited in published original and review articles were searched to find out additional studies.

We identified studies in accordance with the following inclusion criteria: (1) the participants came from Chinese Mainland; (2) concerning risk factors related to COPD; (3) odds ratio (OR) of each risk factors were reported with 95% confidence interval (CI) or raw data were given for calculating; and (4) the study followed a case-control or cohort design. We excluded studies if they were reviews, letters, case reports, case series, cross sectionals and the studies that did not report obviously the population sources or the available data to calculate the OR. The discrepancies were resolved through discussion.

2.2. Data extraction

Data were screened closely and extracted independently by two investigators (J. M. and Z. Y.). A third reviewer (J. L.) made the final decision when inconsistency occurred between the above two reviewers. Data were collected from the included studies as follows: first author's name, year of publication, study design, study region, sample size, number of cases and controls, potential risk factors for COPD, and OR with 95% CIs.

2.3. Quality assessment

The Newcastle-Ottawa Scale (NOS) [6], which is one of the most useful for assessing methodological quality of non-randomized studies, was used to assess the risk of bias in the included studies. The criteria included three categories: (1) selection (4 items); (2) comparability (1 item); and (3) exposure for case-control study (3 items). A study can be awarded a maximum of one star for each numbered item within the selection and exposure categories. A maximum of two stars can be given for comparability