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Prevalence of Dry Eye Disease in Chinese Population: A Systematic Review and Meta-Analysis

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Corresponding author:
Baocang ma

812960081@qq.com

Author Affiliation:
China State Institute of Pharmaceutical Industry.

Ma, BC; Deng, YF; Li, YZ; Liu, ZT; Quan, Y; Wang L; Wang J; Liu, L.

ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 9 December 2025 and was last updated on 9 December 2025.

INTRODUCTION

Review question / Objective With the popularization of modern lifestyle, changes in environmental factors, and evolution of population structure, dry eye disease has become one of the common ocular surface diseases among people. Its prevalence shows a continuous upward trend, and its pathogenesis is complex and diverse. The loss of tear film homeostasis is the core pathophysiological link in the occurrence and development of dry eye disease, involving the interaction of multiple factors such as insufficient tear secretion, excessive evaporation, ocular surface inflammation, and abnormal nerve sensation. This imbalance in homeostasis is not only closely related to meibomian gland dysfunction but also widely affected by internal and external environments such as systemic diseases, local medication, ocular surgery, and air pollution. Ultimately, it leads to a vicious cycle of ocular surface epithelial damage, increased tear film osmolarity, and inflammation, clinically manifested as a series of symptoms such as eye dryness, foreign body sensation, visual fatigue, and visual fluctuation, significantly reducing the quality of life and visual function of patients. However, there is currently a lack of an evidence - based medicine integrated analysis for systematically evaluating the prevalence of dry eye disease based on large - sample epidemiological data from the Chinese population. This study aims to comprehensively review existing research evidence through systematic review and Meta - analysis to quantify the overall prevalence of dry eye disease in the Chinese population, with the expectation of providing key data support and decision - making basis for the clinical diagnosis and treatment norms, public health interventions, and health resource allocation of this disease.

Condition being studied Dry eye disease is a multifactorial condition characterized by an

imbalance in tear film homeostasis on the ocular surface. Its core features include tear film instability, ocular surface inflammation and injury, and neurosensory abnormalities, which often create a self-perpetuating pathological cycle. Clinically, patients report symptoms such as dryness, foreign body sensation, burning, visual fatigue, and fluctuating visual acuity. These symptoms are frequently worsened by increased ocular load, significantly impacting both vision quality and daily life.

The disease is primarily classified into two types: insufficient tear production (aqueous deficiency) and excessive tear evaporation. Insufficient tear production is often linked to hypoplasia of the lacrimal glands, whereas excessive tear evaporation typically results from blepharospasmal gland dysfunction. Its progression is closely associated with age (particularly in women), hormonal changes, autoimmune diseases, prolonged use of video terminals, specific medications, and environmental factors. As society ages and electronic device usage becomes more prevalent, the disease burden is rising.

Diagnosis currently involves a combination of standardized symptom assessments, such as the OSDI scale, and objective tests like tear film break-up time, tear secretion tests, ocular surface staining, and blepharography. To better understand the disease's impact on the Chinese population, this study seeks to integrate existing epidemiological data through systematic evaluation and meta-analysis. The goal is to obtain a reliable combined estimate of the disease's prevalence, providing an evidence-based foundation for clinical prevention, treatment, and public health strategies.

METHODS

Search strategy This study will strictly follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines for literature retrieval and screening. The retrieval scope covers major Chinese and English biomedical databases. Chinese databases include the China National Knowledge Infrastructure (CNKI), WanFang Data Knowledge Service Platform (WanFang Data), VIP Chinese Journal Service Platform (VIP), and China Biology Medicine disc (SinoMed). English databases include PubMed, Embase, Web of Science, Cochrane Library, ProQuest, Ovid MEDLINE, and Scopus.

The retrieval strategy is constructed around three core dimensions: disease, research type, and geographical region. For the target disease "dry eye disease", its Medical Subject Headings (MeSH) (such as "Dry Eye Syndromes" or "Dry Eye disease") will be used, and relevant free - terms will be expanded, including but not limited to the Chinese and English corresponding expressions of dry eye syndrome, dry eye disease, dry eye, xerophthalmia, keratoconjunctivitis sicca, etc. The research type focuses on prevalence surveys. The combination will be made by using MeSH terms (such as "Prevalence", "Incidence", "Epidemiology", "Morbidity", "Mortality") and free - terms (such as "prevalence", "incidence", "epidemiology", "incidence", "mortality", "cross - sectional study", "disease burden", "occurrence rate", etc.). The geographical region is limited to the Chinese population. The search terms will cover "China", "Chinese", "People's Republic of China", and regional expressions such as "Taiwan", "Hong Kong", and "Macao" to ensure the comprehensiveness of the included studies.

Specific search formulas will be customized and optimized according to the terminology systems and grammar rules of each database. There is no start time set for the literature search, and the deadline is tentatively set as December 5, 2025. The languages are limited to Chinese and English.

Two researchers will independently conduct two rounds of screening on all retrieved literature: in the first round, obviously irrelevant literature will be excluded based on the titles and abstracts; in the second round, the full - text of the remaining literature will be read, and a final decision will be made according to the pre - set inclusion and exclusion criteria. Any disagreements during the screening process will be resolved through discussion or arbitration by a third researcher to ensure the objectivity and rigor of the literature selection process.

Participant or population Chinese.

Intervention Not applicable.

Comparator Not applicable.

Study designs to be included Observational studies: cross-sectional studies, cohort prospective studies and cohort retrospective studies will be included.

Eligibility criteria Literature inclusion criteria: (1) The study type must be a cross-sectional study, a cohort study (either prospective or retrospective), or data from an epidemiological survey using a secondary healthcare database; (2) The study subjects must be the Chinese population; (3) The diagnostic criteria are clear and consistent; (4) The outcome indicator is an observational study reporting the prevalence or incidence of dry eye disease or providing data required for calculating

these rates. Literature exclusion criteria: (1) Non-Chinese/English literature and studies not on the Chinese population; (2) Animal experiments, clinical trials, case reports, case series, case-control studies, interventional studies, reviews, systematic reviews, biomedical and pharmacokinetic studies, and literature without clearly stating the study type; (3) Conference papers, duplicate publications, and literature with unavailable full text or key data; (4) Studies related to the prevalence of dry eye disease investigated or detected in outpatient clinics; (5) Other literature with non-matching research content; (6) Literature with a total sample size of less than 50 and obvious errors in key data.

Information sources International electronic databases, including PubMed, Embase, Web of Science, ProQuest、Ovid Medline, Scopus, along with Chinese databases, China National Knowledge Infrastructure (CNKI), Wanfang Database, Chinese VIP Information and China Biology Medicine (CBM) were searched.

Main outcome(s) The prevalence of dry eye disease in Chinese population.

Additional outcome(s) The prevalence of dry eye disease in different subgroups of the Chinese population. Different subgroups of people include: age, gender, occupation, environment, region, etc.

Data management We used Endnote X9 to manage the literature. First, duplicate literature was removed. Second, literature related to reviews, systematic evaluations, comments, introductions, animal experiments, etc. was excluded. Third, by reading the titles and abstracts, literature with inconsistent research content was removed, such as literature related to clinical trials, case reports, case series, case - control studies, randomized controlled trials, etc. Subsequently, literature with non - rigorous observational designs, incorrect research methods, inconsistent outcome indicators, and research on ophthalmic outpatients was excluded. Finally, through full - text reading, the literature to be finally included was selected. In this study, two independent reviewers evaluated the titles and abstracts; then, the full texts of the studies were considered to determine whether they met the inclusion criteria. When the two reviewers disagreed, the principal investigator made the decision on whether to include the literature in the study. For articles whose full texts could not be obtained, an email request was sent to the corresponding author, and their responses within two weeks were considered.

Quality assessment / Risk of bias analysis The risk of bias assessment of the studies will be independently conducted by two reviewers. For different types of studies, we will use corresponding standardized tools: The quality of cross-sectional studies will be evaluated using the Joanna Briggs Institute's Critical Appraisal Checklist for Cross-Sectional Studies. The quality of cohort studies will be assessed using the Newcastle-Ottawa Scale. Any disagreements will be resolved through consultation or adjudication by a third senior researcher.

Strategy of data synthesis Data processing was performed using the statistical software Stata 15.1. The $\chi 2$ test was used to examine the heterogeneity among studies, with a significance level of $\alpha = 0.1$. Then, the degree of heterogeneity was estimated based on the I2 value: $I2 < 50\%$, it suggested the presence of statistical heterogeneity, and a random - effect model was used for the meta - analysis.

Subgroup analysis To explore the sources of heterogeneity and provide more accurate prevalence estimates, this study plans to conduct subgroup analyses. The analysis factors include: demographic characteristics (e.g., age, gender, geographical distribution), study design (cross-sectional studies vs. cohort studies), DED diagnostic criteria (e.g., based on signs, symptoms), and study quality (e.g., general journals, core journals, SCI journals). Additionally, when data are available, the impact of occupational exposure (e.g., video terminal users, workers, students, farmers, military personnel, cadres, etc.) will be analyzed. Differences between subgroups will be statistically compared through inter-group heterogeneity tests.

Sensitivity analysis In this study, a sensitivity analysis was conducted. By excluding individual studies one by one, alternately using fixed and random - effect models, and repeating the pooling process with different rate conversion methods, the results showed that there were no significant clinically meaningful changes in the point estimates and confidence intervals of the pooled effect size under all scenarios. This indicates that the results of this Meta - analysis are robust and reliable, not overly influenced by any single study or the choice of statistical method, and the overall stability is good.

Language restriction English or Chinese.

Country(ies) involved China.

Other relevant information No

Keywords China, Dry eye disease, Prevalence, Meta-analysis, Incidence.

Dissemination plans We plan to disseminate the study results through various channels. First, the complete report will be submitted to a peer-reviewed scientific journal for publication. Second, we will present the findings at relevant academic conferences. Additionally, we will create a summary for ophthalmologists and distribute it via professional online platforms to aid in translating the findings into clinical practice. Lastly, the anonymized data from this systematic evaluation will be available from the corresponding authors upon reasonable request.

Contributions of each author

Author 1 - baocang ma - Conceptualized the study, and was responsible for drafting and editing the manuscript.
Email: 812960081@qq.com
Author 2 - Yifang Deng - A literature retrieval strategy was designed, and the literature was screened and evaluated.
Email: dengyifang_dyf@163.com
Author 3 - Yizhi Li - Performed the data extraction.
Email: liyz0123@163.com
Author 4 - Zitong Liu - Provided statistical expertise and analysis.
Email: l1198946870@163.com
Author 5 - Yan Quan - When there is a disagreement between the two current literature reviewers, serve as a third - party to independently evaluate the literature.
Email: 397352071@qq.com
Author 6 - Lan Wang - Edit and revise the initial manuscript.
Email: 280210881@qq.com
Author 7 - Juan Wang - Developed the study selection criteria and the risk of bias assessment strategy, and critically revised the full manuscript.
Email: juanwangjuan@aliyun.com
Author 8 - Li Liu - Critically reviewed and approved the final manuscript.
Email: liulisipi@hotmail.com