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The impact of smoking and alcohol consumption on the risk of psoriasis: a systematic review and dose–response meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

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 26 January 2026 and was last updated on 26 January 2026.

INTRODUCTION

Review question / Objective The objective of this systematic review and meta-analysis is to evaluate the independent associations between smoking and alcohol consumption and the risk of incident psoriasis, including its clinical subtypes such as palmoplantar pustulosis (PPP) and psoriatic arthritis (PsA), in the general population.

Specifically, this review aims to: (1) quantify the associations between smoking and alcohol consumption and the risk of psoriasis and its subtypes; (2) examine dose–response relationships according to smoking intensity, duration, cumulative exposure, and alcohol intake; and (3) assess the potential impact of smoking cessation on the risk of developing psoriasis.

Rationale Psoriasis is a chronic immune-mediated inflammatory skin disease with increasing global prevalence. Although genetic susceptibility plays an important role, modifiable lifestyle factors such as smoking and alcohol consumption may substantially influence disease onset and progression.

Previous epidemiological studies and meta-analyses investigating the associations between smoking, alcohol consumption, and psoriasis have reported inconsistent findings, partly due to heterogeneity in exposure definitions, outcome classification, and inadequate consideration of dose–response relationships. In addition, many earlier reviews did not adequately distinguish between current, former, and never smokers, nor did they systematically evaluate the effects of smoking cessation or psoriasis subtypes such as palmoplantar pustulosis and psoriatic arthritis.

Therefore, a comprehensive and updated systematic review and dose–response meta-analysis is warranted to clarify these associations, quantify exposure–risk gradients, and provide robust evidence to inform primary prevention

strategies and lifestyle-based risk management in psoriasis.

Condition being studied Psoriasis, including psoriasis vulgaris, palmoplantar pustulosis (PPP), and psoriatic arthritis (PsA).

METHODS

Search strategy Electronic databases including PubMed, Embase, Web of Science, and the Cochrane Library were systematically searched from inception to December 18, 2025.

The search strategy combined Medical Subject Headings (MeSH) and free-text terms related to psoriasis (e.g., "psoriasis", "psoriatic"), smoking (e.g., "smoking", "cigarette", "tobacco", "nicotine"), and alcohol consumption (e.g., "alcohol", "drinking", "alcohol consumption", "ethanol").

No language restrictions were applied. The detailed search strategies for each database are provided in the supplementary materials.

Participant or population Adults from the general population or individuals without psoriasis at baseline.

For case–control studies, participants include incident or newly diagnosed psoriasis patients (including clinical subtypes such as palmoplantar pustulosis and psoriatic arthritis) and individuals without psoriasis as controls.

Intervention Exposure to smoking and/or alcohol consumption, including smoking status (current, former, never), smoking intensity, duration, cumulative exposure (pack-years), and alcohol consumption status, frequency, or amount standardized as grams of ethanol per day.

Comparator Never smokers or individuals with the lowest level of smoking exposure; non-drinkers or individuals with the lowest level of alcohol consumption.
For smoking cessation analyses, comparators include current smokers or never smokers, depending on the specific research question.

Study designs to be included Observational study designs will be included, including prospective and retrospective cohort studies, case–control studies, nested case–control studies, and twin studies.For studies that include both observational analyses and Mendelian randomization analyses, only the observational components will be extracted and synthesized.

Eligibility criteria
Inclusion criteria:
(1) Observational studies evaluating the association between smoking and/or alcohol consumption and the risk of incident psoriasis or its clinical subtypes;
(2) Studies conducted in the general population or in individuals free of psoriasis at baseline;
(3) Studies reporting effect estimates (OR, RR, or HR) with 95% confidence intervals or providing sufficient data for calculation.

Exclusion criteria:
(1) Reviews, meta-analyses, editorials, conference abstracts, or case reports;
(2) Animal or in vitro studies;
(3) Studies without extractable or calculable effect estimates;
(4) Duplicate publications from the same cohort (the most complete or largest study will be retained);
(5) Case–case studies without incidence outcomes.

Information sources Electronic databases including PubMed, Embase, Web of Science, and the Cochrane Library will be searched.

Main outcome(s) The primary outcomes are the risk of incident psoriasis and its clinical subtypes, including palmoplantar pustulosis and psoriatic arthritis.

Effect estimates will be expressed as relative risks (RRs), with odds ratios (ORs) and hazard ratios (HRs) treated as equivalent measures due to the low incidence of psoriasis.

Additional outcome(s) Additional outcomes include dose–response relationships between smoking exposure (smoking intensity, duration, and cumulative pack-years) and psoriasis risk, as well as between alcohol intake (grams of ethanol per day) and psoriasis-related outcomes.

Subtype-specific outcomes, including palmoplantar pustulosis and psoriatic arthritis, and smoking cessation–related outcomes (risk reduction relative to current smokers and residual risk compared with never smokers), will also be evaluated where data permit.

Data management All records retrieved from database searches will be imported into reference management software for deduplication.

Study selection, data extraction, and quality assessment will be conducted independently by two reviewers using standardized data extraction forms.

Any discrepancies will be resolved through discussion or consultation with a third reviewer. Extracted data will be stored in secure electronic files for analysis.

Quality assessment / Risk of bias analysis The methodological quality of included observational studies will be assessed using the Newcastle–Ottawa Scale (NOS) for cohort and case–control studies.

Studies will be evaluated across three domains: selection, comparability, and outcome or exposure assessment. Total scores will be used to classify studies as high, moderate, or low quality.

Quality assessment will be performed independently by two reviewers, with disagreements resolved by consensus.

Strategy of data synthesis Effect estimates (ORs, RRs, and HRs) will be transformed to a common relative risk (RR) scale and pooled using random-effects meta-analysis.

Statistical heterogeneity will be assessed using the Cochran Q test and the I^2 statistic. Subgroup and sensitivity analyses will be conducted to explore potential sources of heterogeneity.

Dose–response relationships will be examined using two-stage random-effects models with restricted cubic splines.

Publication bias will be evaluated using funnel plots and Egger's regression test, and the trim-and-fill method will be applied when appropriate.

Subgroup analysis Subgroup analyses will be performed according to study design (cohort studies vs case–control studies) and geographic region where data permit.

Where sufficient data are available, subgroup analyses by psoriasis subtype (including palmoplantar pustulosis and psoriatic arthritis) will also be conducted.

For smoking-related analyses, subgroup analyses based on smoking status (current, former, never smokers) may be explored.

Sensitivity analysis Sensitivity analyses will be conducted to assess the robustness of the pooled results.

These analyses will include leave-one-out analyses, exclusion of studies with lower methodological quality, and stratification by effect measure type (OR, RR, or HR).

Additional sensitivity analyses may be performed by excluding studies with extreme exposure definitions or high heterogeneity.

Language restriction No language restrictions will be applied.

Country(ies) involved China.

Keywords Psoriasis; Smoking; Alcohol consumption; Dose–response; Meta-analysis; Systematic review.

Dissemination plans The results of this systematic review and meta-analysis will be submitted for publication in a peer-reviewed international journal and may be presented at relevant academic conferences.

Contributions of each author

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