INPLASY

Impact of Alcohol Consumption on atherosclerosis: A Systematic Review and Meta-analysis

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Corresponding author:
jiayuan song

3144198849@qq.com

Author Affiliation:
Changchun University of Chinese Medicine.

Song, JY.

ADMINISTRATIVE INFORMATION

Support - No.

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 9 January 2025 and was last updated on 9 January 2025.

INTRODUCTION

Review question / Objective Atherosclerosis is a chronic vascular condition characterized by lipid deposition in the arterial intima, smooth muscle cell proliferation, and increased fibrous tissue, leading to plaque formation, arterial narrowing, hardening, and blood flow obstruction[1]. This disease can affect multiple arterial systems throughout the body, including the coronary, carotid, cerebral, renal, and peripheral arteries[2-4]. Coronary artery atherosclerosis is the primary cause of coronary heart disease, while atherosclerosis of the carotid and cerebral arteries is strongly linked to stroke[5, 6]. Various risk factors contribute to the development of atherosclerosis, including hypertension, hyperlipidemia, diabetes, smoking, obesity, physical inactivity, and genetic predisposition. These factors promote inflammation, damage the endothelium, and acceleratelipid deposition, which in turn drives the progression of the disease[7, 8].

Dietary factors, particularly alcohol consumption, play a significant role in the onset and progression of atherosclerosis[9]. The impact of alcohol on this disease, however, remains contentious. Some studies suggest that moderate alcohol intake may slow atherosclerosis progression by increasing high-density lipoprotein cholesterol (HDL-C) levels and exerting antioxidant effects[10, 11]. In contrast, excessive alcohol consumption has harmful effects on cardiovascular health, including raising blood pressure, disrupting lipid metabolism, and worsening liver damage, all of which accelerate atherosclerosis development[12]. Furthermore, the effects of different types of alcoholic beverages on arterial health can vary. Research indicates that polyphenols found in red wine may offer potent antioxidant benefits[13], suggesting that moderate red wine consumption could potentially help prevent cardiovascular diseases.

This study investigates the relationship between alcohol consumption and the risk of atherosclerosis through a systematic review and meta-analysis. It specifically examines the type of alcoholic beverage, the various sites of atherosclerosis (including the coronary, carotid, and peripheral arteries), and regional differences across countries. The results aim to provide evidence-based guidance for the clinical

management of atherosclerosis, supporting the development of precision medicine and personalized treatment strategies.

Condition being studied The initial search yielded 1054 articles. After removing duplicates, 898 articles remained. Through careful review of the titles, abstracts, and full texts, and by strictly adhering to the inclusion and exclusion criteria, a total of 26 studies were ultimately included in the analysis.

METHODS

Participant or population The study subjects are patients with atherosclerosis.

Intervention The study subjects are patients with atherosclerosis. There is no restriction on the type of study. The study results should provide data on the correlation between alcohol consumption and atherosclerosis to assess the relationship between alcohol intake and atherosclerosis.

Comparator No.

Study designs to be included To address this, we conducted subgroup analyses based on country, study type, arterial location, diagnostic criteria, alcohol type, and gender.

Eligibility criteria
Exclusion Criteria
Studies with subjects who are not patients with atherosclerosis.
Studies whose results do not align with the inclusion criteria.
Reviews, case studies, survey analyses, conference abstracts, and unrelated literature.
Duplicate publications.

Information sources We conducted a computer-assisted search of the following databases: PubMed, Embase, Cochrane, and Web of Science. The search focused on studies related to the correlation between alcohol consumption and atherosclerosis. The search spanned from the inception of each database to December 2024.

Main outcome(s) Whether or not atherosclerosis is present.

Quality assessment / Risk of bias analysis Quality assessment was conducted using the Agency for Healthcare Research and Quality (AHRQ) criteria, a widely recognized framework for evaluating the methodological rigor of health research studies. The AHRQ criteria provide a comprehensive set of standards to assess the quality of studies in various domains, including study design, sample size, risk of bias, measurement methods, and the appropriateness of statistical analyses. This framework helps to ensure that the studies included in the analysis are robust and reliable, minimizing the risk of bias and enhancing the validity of the findings.

Strategy of data synthesis The extracted data were subjected to meta-analysis using STATA 16.0 software. The specific procedures are as follows:
Effect Size Selection: The odds ratio (OR) was used for analysis, and its 95% confidence interval (CI) was calculated.
Heterogeneity Test: Heterogeneity was assessed using P-values and I^2 statistics. If $P > 0.1$ and $I^2 \leq 50\%$, heterogeneity was considered low, and a fixed-effect model (FE) was used for analysis. If $P \leq 0.1$ and $I^2 > 50\%$, heterogeneity was considered high, and a random-effect model (RE) was used for analysis.
Assessment of Publication Bias: Funnel plots and Egger's test were used to evaluate the possibility of publication bias in the literature on the correlation between alcohol consumption and atherosclerosis.
Sensitivity Analysis: A sensitivity analysis was conducted using the exclusion method to assess the stability of the results for the literature on the correlation between alcohol consumption and atherosclerosis.
Meta-Regression and Subgroup Analysis: Meta-regression and subgroup analyses were performed to identify sources of heterogeneity and to assess the impact of heterogeneity on the study results in the literature on the correlation between alcohol consumption and atherosclerosis.

Subgroup analysis To address this, we conducted subgroup analyses based on country, study type, arterial location, diagnostic criteria, alcohol type, and gender.

Sensitivity analysis Sensitivity analysis confirmed that the results remained consistent even after sequentially excluding each study, demonstrating the robustness of the findings.

Country(ies) involved China.

Keywords Alcohol; Consumption; atherosclerosis; meta.

Contributions of each author
Author 1 - Jiayuan Song.
Email: 13894754778@163.com