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Acute myocardial infarction associated with amphetamine and methamphetamine use in young adults: A systematic review of case reports and case series.

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ADMINISTRATIVE INFORMATION

Support - This research has no financial support.

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 14 May 2026 and was last updated on 14 May 2026.

INTRODUCTION

Review question / Objective The aim of this systematic review is to synthesize the available evidence from case reports and case series in order to evaluate the possible association between amphetamine or methamphetamine use and acute myocardial infarction in young patients.

Therefore, according to the PEO framework, the research question is: What is the association between amphetamine or methamphetamine use (E) and acute myocardial infarction (O) among adults under 45 years of age (P)?

Rationale Cardiovascular diseases remain a leading cause of death worldwide, with ischemic heart disease being the most frequent cause of mortality. In recent decades, several high-income countries have reported a decrease in the incidence and mortality of acute ischemic events, a phenomenon attributed to reduced tobacco consumption, improved control of cardiovascular risk factors, and the implementation of high-

sensitivity biomarkers. However, this trend has not been consistent across all age groups.

Acute myocardial infarction (AMI) continues to be one of the leading causes of mortality and morbidity worldwide. Although its occurrence is strongly associated with advancing age, recent evidence indicates an alarming increase in the incidence of AMI among younger individuals, commonly defined as adults younger than 45 years. [LC1.1] In particular, a progressive increase in ischemic events has been observed among young adults, who present specific pathophysiological and angiographic characteristics. In this group, in addition to traditional risk factors, genetic and thrombotic factors, including alterations in genes related to coagulation and vascular inflammation, are becoming increasingly relevant. This rising incidence has also been linked to lifestyle changes, including increased psychosocial stress, sedentary behavior, obesity, and illicit substance use. Notably, it has been reported that approximately one in ten patients hospitalized for acute ischemic events is under 55 years of age [MV2.1][LC2.2], and

nearly 90% of these individuals present lifestyle-related risk factors.

In this context, the use of amphetamines and methamphetamines has gained particular attention, especially among young adults. Although they tend to have lower in-hospital mortality rates, the long-term impact, especially in the context of chronic use of these substances, remains a subject of debate. The available evidence is still limited and heterogeneous; therefore, it is necessary to systematically synthesize updated information on reported clinical cases in order to evaluate the possible association between amphetamine/methamphetamine use and acute myocardial infarction in young patients, given that its use constitutes an emerging and potentially preventable risk factor. The findings of this review seek to contribute to a better understanding of the phenomenon, support the design of primary prevention strategies aimed at young and vulnerable populations, and guide therapeutic decision-making in the management of acute ischemic events associated with the consumption of these substances.

Condition being studied Ischemic heart disease, particularly acute myocardial infarction in young adults is the condition under study. Acute myocardial is characterized by reduced coronary blood flow due to partial or complete obstruction of the coronary arteries and may clinically manifest as chest pain, dyspnea or diaphoresis. [MV3.1]Recent evidence suggests a rising incidence of acute ischemic events in young adults, a population with distinct clinical and pathophysiological features compared to older individuals.

METHODS

Search strategy • PubMed. ("amphetamine" OR "methamphetamine") AND ("myocardial infarction" OR "myocardial ischemia" OR "acute coronary syndrome") Article type: case reports.

• Scopus. ("amphetamine" OR "methamphetamine") AND ("myocardial infarction" OR "myocardial ischemia" OR "acute coronary syndrome") Document type: Article.

• Web of Science. ("amphetamine" OR "methamphetamine") AND ("myocardial infarction" OR "myocardial ischemia" OR "acute coronary syndrome") Document type: Article.

• Springer. ("amphetamine" OR "methamphetamine") AND ("myocardial infarction" OR "myocardial ischemia" OR "acute coronary syndrome") AND "case report" Content type: Article.

• SciELO. ("anfetamina" OR "metanfetamina") AND "infarto de miocardio"

• LILACS. ("anfetamina" OR "metanfetamina") AND "infarto de miocardio".

Participant or population Adult patients under 45 years of age with acute myocardial infarction.

Intervention Exposure to the consumption of amphetamine or methamphetamine.

Comparator Without a comparator.

Study designs to be included Case reports and case series.

Eligibility criteria Case reports and case series published in English or Spanish describing patients ≥ 18 and under 45 years with a documented history of amphetamine and/or methamphetamine use, confirmed by medical history, toxicological tests or both; cases with a diagnosis of acute myocardial infarction supported by clinical and electrocardiographic criteria; with additional biochemical and angiographic data when available. Case reports and case series in which psychostimulant use was prescribed for the treatment of attention-deficit/hyperactivity disorder were excluded. We also excluded reports involving pregnant women, patients using hormonal contraceptives prior to myocardial infarction, patients with a history of heart disease unrelated to methamphetamine or amphetamine use, and cases reporting acidosis and/or hyperkalemia.

Information sources The search will be conducted in the following databases: PubMed, Scopus, Web of Science, Springer, LILACS, and SciELO.

Main outcome(s) Acute myocardial infarction.

Additional outcome(s) Left ventricular ejection fraction.

Data management The studies selected for full-text review will be assessed independently by two reviewers (M.A.V.O. and L.C.D.), who will screen the titles and abstracts of all retrieved records to identify potentially eligible studies. Any discrepancies will be resolved through discussion and consensus. Subsequently, the full texts of the selected studies will be reviewed.

Data extraction will be conducted using a pre-designed standardized format. When information is unavailable or unclear, it will be recorded as unreported data without further inference. No automated tools will be used during this process.

For the synthesis of results, the studies will be grouped qualitatively, considering the type of clinical presentation of myocardial infarction, the diagnostic findings, and the reported cardiovascular outcomes.

The following data will be collected: general study characteristics (year of publication and country), patient characteristics (age and sex), presentation of acute myocardial infarction (clinical, electrocardiographic, and angiographic findings), additional data (laboratory findings and ventricular function assessed by left ventricular ejection fraction), type and route of amphetamine/methamphetamine use, confirmatory methods for drug use (medical history and toxicology panel), therapeutic interventions, medical history, and comorbidities.

Quality assessment / Risk of bias analysis

Joanna Briggs Institute (JBI) tool will be used to assess quality.

Strategy of data synthesis A systematic review chart will be elaborated. For each case report, the following variables will be collected: sex, age, diagnosis of Acute Myocardial Infarction, type of drug used and pattern of use, method of confirmation of drug consumption (clinical history, toxicological testing, or both), and the management of the acute myocardial infarction. Additional data, when available, will include laboratory findings, medical history, and comorbidities.

Subgroup analysis If possible, subgroups will be created based on type of drug, duration of consumption or sex.

Sensitivity analysis Given the inclusion of case reports and case series, a formal sensitivity analysis will not be conducted. Instead, if possible, the robustness of the findings will be explored through descriptive subgroup analyses and by assessing the impact of excluding cases with incomplete or low-quality data.

Language restriction Studies published in English and Spanish.

Country(ies) involved México.

Other relevant information Non.

Keywords Amphetamine; methamphetamine; infarction; young adult; acute coronary syndrome.

Dissemination plans At the end of the review, it will be published in a peer-reviewed journal.

Contributions of each author

Author 1 - Marco Antonio Villegas-Ortiz - Contributions: review conception, review design, data management, data analysis, data interpretation.

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Author 2 - Lizett Castrejón-Delgado - Contributions: review coordination, data collection, protocol and review writing.

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