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Acute Myocardial Infarction in Young Adults (30–40 years): A Systematic Review of Risk Factors, Clinical Characteristics, and Outcomes

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Abstract

Introduction: Acute myocardial infarction (AMI) remains one of the leading causes of morbidity and mortality worldwide, representing a major challenge for healthcare systems due to its high incidence, healthcare costs, and functional and socioeconomic consequences associated with the disease.

Objective: To conduct a systematic review of the literature on acute myocardial infarction in young adults aged 30 to 40 years, synthesizing available evidence regarding risk factors, clinical presentation characteristics, and the main clinical outcomes described in the scientific literature.

Methods: This study consists of a systematic review, classified as exploratory and descriptive. The research was developed through a bibliographic search in electronic databases, following methods associated with Systematic Literature Review (SLR) and applications of the SMARTER (Simple Multi-Attribute Rating Technique using Exploiting Rankings) method.

Results: The studies demonstrated that young adults had lower rates of in-hospital and short-term mortality compared with older populations, probably due to a lower burden of comorbidities and greater functional reserve. However, the persistence of modifiable cardiovascular risk factors, particularly smoking, obesity, dyslipidemia, and diabetes mellitus, was associated with an increased risk of recurrent cardiovascular events, reinfarction, the need for repeat revascularization, and the development of heart failure during follow-up.

Conclusion: This systematic review demonstrated that acute myocardial infarction in young adults represents an important public health concern, with its incidence increasing in recent decades due to greater exposure to modifiable cardiovascular risk factors.

Keywords

Myocardial Infarction, Young Adult, Coronary Artery Disease, Cardiovascular Risk Factors, Prognosis.

Introduction

Acute myocardial infarction (AMI) remains one of the leading causes of morbidity and mortality worldwide, representing a significant challenge for healthcare systems due to its high incidence, healthcare costs, and functional and socioeconomic repercussions [1,2]. Although traditionally considered a condition prevalent in elderly individuals, in recent decades there has been a progressive increase in the occurrence of AMI in young adults, especially in the 30-40 age group, a phenomenon that is causing growing concern in the scientific community and among healthcare professionals [1,3].

The development of myocardial infarction (MI)

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in young adults presents epidemiological and pathophysiological characteristics distinct from those observed in older individuals. While in the latter, advanced atherosclerotic processes associated with vascular aging predominate, in young patients, intense modifiable risk factors, genetic predisposition, prothrombotic states, inflammatory diseases, metabolic alterations, and inadequate lifestyle habits frequently coexist [1,4]. Among the most frequently associated factors are smoking, obesity, systemic arterial hypertension, diabetes mellitus, dyslipidemia, sedentary lifestyle, psychosocial stress, alcohol and illicit drug use, and a family history of early coronary artery disease [3,4].

Alongside the increasing prevalence of obesity, metabolic syndrome, and diabetes mellitus in younger populations, lifestyle changes characterized by inadequate diet, reduced physical activity, chronic sleep deprivation, and increased exposure to occupational stress have significantly contributed to the anticipation of cardiovascular risk [5-7]. These factors have been altering the epidemiological profile of AMI, making its occurrence increasingly frequent in economically active individuals, which amplifies the social, family, and economic impacts resulting from the disease [1,7,8].

In addition to differences in risk factors, acute myocardial infarction (AMI) in young adults can present with particular clinical features. Although chest pain remains the main symptom, less typical presentations, such as dyspnea, fatigue, nausea, and epigastric discomfort, are more frequently observed in women and individuals with diabetes mellitus, potentially delaying the recognition of acute coronary syndrome [9,10]. Furthermore, lower clinical suspicion in young patients, coupled with a perception of low risk by both healthcare professionals and patients themselves, can contribute to delays in seeking medical attention, diagnosis, and initiation of reperfusion therapy, compromising prognosis and increasing the risk of cardiovascular complications [1,8,11].

Clinical outcomes following acute myocardial infarction (AMI) in young adults present particular characteristics. Although these patients generally have a lower burden of comorbidities and lower in-hospital and short-term mortality rates compared to older individuals, the cardiovascular event can lead to significant consequences during follow-up, including heart failure, recurrence of ischemic events, reinfarction, need for revascularization, and impaired quality of life [11-13]. Furthermore, the persistence of modifiable cardiovascular risk factors, such as smoking, obesity, dyslipidemia, systemic hypertension, and diabetes mellitus, is associated with increased recurrence of cardiovascular events and long-term cardiovascular mortality [1,8]. Considering that these individuals are often in the prime of their productive lives, the impact of AMI goes beyond clinical aspects, significantly affecting work capacity, economic productivity, quality of life, and family context, which reinforces the need for effective strategies for secondary prevention, cardiovascular rehabilitation, and continuous clinical follow-up [7,10].

In recent years, several studies have investigated the determinants of acute myocardial infarction (AMI) in young adults; however, the results remain heterogeneous regarding the predominant risk factors, clinical presentation characteristics, therapeutic strategies, and observed clinical outcomes [1,8]. Furthermore, the literature presents significant methodological differences related to the definition of the age range for characterizing early AMI, study design, follow-up time, and characteristics of the populations evaluated, hindering comparison between studies and the consolidation of available evidence [1,12]. In this context, systematic reviews become fundamental to critically synthesize the available evidence and identify knowledge gaps that can support future research and strategies for prevention and clinical management.

Given this scenario, a systematic synthesis of the literature is necessary, capable of gathering and critically analyzing current evidence on the clinical and epidemiological profile of acute myocardial infarction in young adults. Identifying the main risk factors, the most frequent clinical manifestations, and the associated outcomes may contribute to improving strategies for prevention, early diagnosis, risk stratification, and therapeutic management of this specific population.

Thus, the present study aims to conduct a systematic review of the literature on acute myocardial infarction in young adults between 30 and 40 years of age, synthesizing the available evidence on risk factors, clinical presentation characteristics, and the main clinical outcomes described in the scientific literature.

Methods

This study consists of a systematic literature review, exploratory and descriptive in nature, conducted with the aim of synthesizing the available scientific evidence regarding risk factors, clinical characteristics, and outcomes of acute myocardial infarction (AMI) in young adults aged 30 to 40 years. The review was developed in accordance with the recommendations of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement, aiming to ensure transparency, reproducibility, and methodological rigor throughout all stages of the research.

The search strategy was conducted in the electronic databases PubMed/MEDLINE, Web of Science, Scopus, ScienceDirect, SpringerLink, Wiley Online Library, and Taylor & Francis Online. Additionally, a manual search was performed in the reference lists of the included studies, as well as on the Google Scholar platform, with the aim of identifying potentially relevant publications not retrieved in the electronic searches.

The selection of descriptors was based on terms registered in the Medical Subject Headings (MeSH) of the US National Library of Medicine and in the Health Sciences Descriptors (DeCS). The following descriptors were used in English: "Myocardial Infarction", "Young Adults", "Risk Factors", "Clinical Characteristics", "Cardiovascular Diseases", and "Outcomes", combined using the Boolean operators AND and OR. As a complementary strategy, searches were also conducted using the corresponding descriptors in Portuguese and Spanish.

Primary studies published in peer-reviewed scientific journals were considered eligible, including observational studies (cohort, case-control, and cross-sectional), as well as prospective and retrospective studies, that investigated patients aged 30 to 40 years diagnosed with acute myocardial infarction and presented information regarding risk factors, clinical characteristics, treatment, or clinical outcomes. There was no restriction regarding the country of origin of the studies.

Case reports, case series with a small number of participants, editorials, letters to the editor, abstracts published in conference proceedings, dissertations, theses, research protocols, experimental studies in animals or in vitro, and studies that did not present specific data for the young adult population or that did not allow the extraction of outcomes of interest were excluded.

The selection of studies was carried out by four independent researchers in two stages. Initially, titles and abstracts were read to

identify potentially eligible studies. Then, the previously selected articles were read in full to verify compliance with the established inclusion and exclusion criteria. Disagreements regarding the eligibility of studies were discussed among the researchers until a consensus was reached. When necessary, the final decision was made consensually among the four reviewers.

Data extraction was also performed independently by the four researchers using a standardized spreadsheet created in Microsoft Excel®. From this form, the following data were recorded for each included study: authors and year of publication, study abstract, methodological design (study type), main results evaluated, limitations, and conclusions. Additionally, information was collected regarding the country where the study was conducted, sample size, characteristics of the studied population, identified risk factors, clinical manifestations, diagnostic methods employed, therapeutic strategies, and clinical outcomes. The extracted data were organized and summarized in Table 1, which presents the main methodological characteristics and the main findings of the studies included in the review.

The data analysis was conducted qualitatively, through a narrative synthesis of the available evidence. The studies were grouped according to their main methodological characteristics, and the results were organized into thematic categories related to cardiovascular risk factors, clinical profile of patients, angiographic characteristics, therapeutic modalities, and clinical outcomes, allowing for an integrated analysis of the evidence available in the literature.

Since this is a systematic review based exclusively on secondary data available in the scientific literature, without direct involvement of human beings or access to identifiable individual information, there was no need to submit the study to a Research Ethics Committee, in accordance with current legislation.

Results

A comprehensive systematic literature search yielded a total of 8279 articles. Of these, 26 studies were excluded due to data overlap. From this, the SMARTER method (*Simple Multi-Attribute Rating Technique using Exploiting Rankings*) was chosen, and 178 articles suitable for full-text screening were selected. Of these, 134 articles were included for data extraction, and 108 were excluded based on exclusion criteria, leaving 26 eligible articles for inclusion in the systematic review. Figure 1 describes the article selection strategy for the topic in question.

Regarding risk factors, smoking was the most frequently reported factor, followed by dyslipidemia, obesity, systemic arterial hypertension, diabetes mellitus, and a family history of early coronary artery disease. Several studies have also identified a high prevalence of sedentary lifestyle, excessive alcohol consumption, illicit drug use, and psychosocial stress as important factors associated with the development of AMI in this population [1,8,14-16].

Regarding clinical characteristics, a predominance of males was observed among the patients evaluated in most studies [11-13]. The most frequent clinical manifestation was chest pain, although atypical presentations, such as dyspnea, fatigue, nausea, and epigastric discomfort, were described more frequently among women and individuals with diabetes mellitus [9,12]. Regarding the electrocardiographic pattern, ST-segment elevation myocardial infarction (STEMI) represented the predominant presentation among young adults [11,17]. In studies that evaluated angiographic findings, single-vessel coronary artery disease was the most common presentation, with the left anterior descending artery being the most frequently identified culprit artery [11,12,18].

With regard to treatment, primary percutaneous coronary intervention (PCI) was the most frequently employed reperfusion

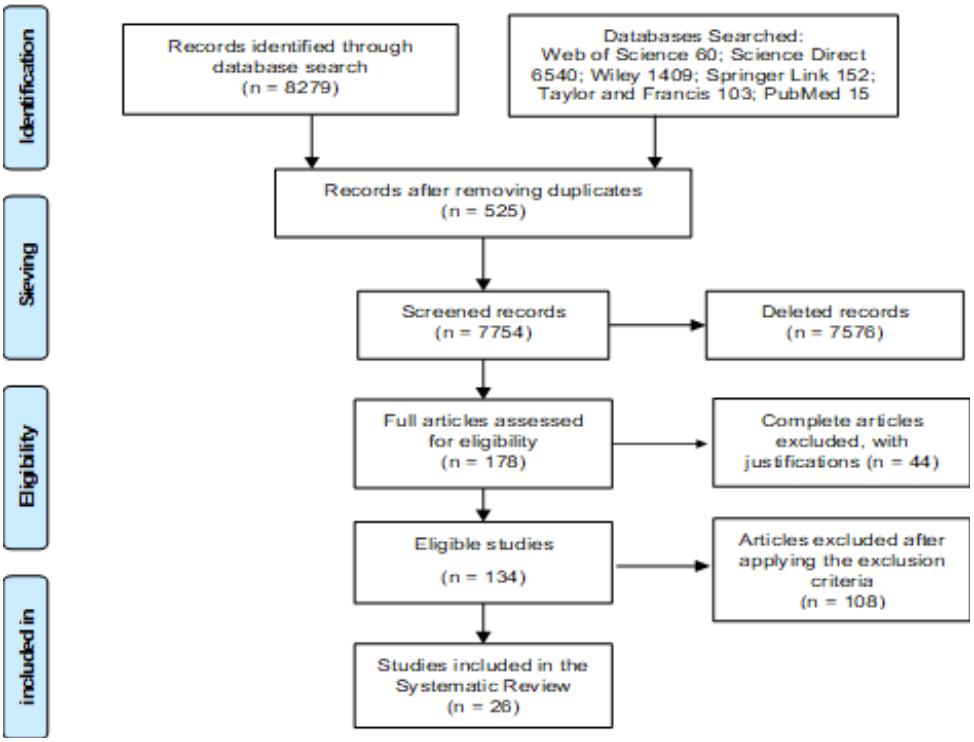


Figure 1: Article search strategy. Source: Authors (2026)

Table 1: Characteristics of the main included studies on acute myocardial infarction in young adults.

Author/Year	Summary	Type of study	Measured result	Limitations	Conclusions
Dugani et al., [19]	It assessed the main risk factors associated with premature acute myocardial infarction (AMI), synthesizing evidence from several studies.	Systematic review and meta-analysis of 77 observational studies.	Association between cardiovascular risk factors and the occurrence of early myocardial infarction, including smoking, hypertension, diabetes, dyslipidemia, obesity, and family history.	Methodological heterogeneity among the studies; different definitions of premature AMI; predominance of observational studies.	Early myocardial infarction (MI) is strongly associated with modifiable risk factors, highlighting the importance of primary prevention and early control of cardiovascular factors.
Lu et al., [20]	The study investigated differences between young men and women regarding factors associated with the first episode of myocardial infarction (MI).	Population-based observational study.	Relationship between sex, metabolic and behavioral factors, and the occurrence of myocardial infarction in young adults.	Potential for residual confounding; observational data; limitations related to the assessment of behavioral factors.	Young women present a distinct cardiovascular risk profile, with a greater relative influence of metabolic and psychosocial factors, reinforcing the need for individualized preventive strategies.
Rallidis et al., [1]	It reviewed the causes, angiographic characteristics, and management of premature myocardial infarction, including atherosclerotic and non-atherosclerotic mechanisms.	Narrative review (*State-of-the-Art Review*).	Etiology, angiographic characteristics, therapeutic strategies, and secondary prevention of early-onset myocardial infarction.	Lack of quantitative synthesis; dependence on the quality of existing studies.	Myocardial infarction (MI) in young people has a multifactorial etiology, involving traditional factors, genetic predisposition, inflammation, thrombosis, and metabolic alterations.
Byrne et al., [10]	It updated the European recommendations for the diagnosis and treatment of acute coronary syndromes.	Clinical guideline based on evidence review and expert consensus.	Diagnostic strategies, reperfusion, pharmacological treatment, and secondary prevention.	Not specifically targeted at young adults; recommendations depend on the quality of available evidence.	Primary percutaneous coronary intervention remains the main reperfusion strategy, associated with antiplatelet therapy, statins, and secondary prevention measures.
Liang et al., [11]	This study evaluated the clinical characteristics, risk factors, and outcomes of young patients with ST-segment elevation myocardial infarction (STEMI).	Retrospective observational study.	Clinical profile, associated factors, treatment performed, and hospital outcomes.	Single-center study; limited sample size; lack of long-term follow-up.	Young adults have lower hospital mortality rates, but factors such as smoking, diabetes, and dyslipidemia negatively influence the prognosis.
Visseren et al., [6]	It presented recommendations for cardiovascular prevention focusing on controlling risk factors and promoting healthy habits.	Clinical guideline based on systematic review and international consensus.	Controlling blood pressure, lipids, obesity, physical activity, diet, and smoking cessation.	Some recommendations have different levels of evidence; their applicability depends on the clinical context.	Cardiovascular prevention should be started early and maintained throughout life to reduce future cardiovascular events.
Satish et al., [21]	Investigated recent trends in the incidence of myocardial infarction and the prevalence of cardiovascular risk factors in young adults.	Observational epide-miological study based on a population database.	Temporal trends in myocardial infarction, hypertension, obesity, diabetes, smoking, and other risk factors.	Reliance on administrative records; possibility of underreporting and lack of detailed lifestyle information.	An increase in the burden of cardiovascular risk factors is observed among young adults, reinforcing the need for targeted preventive strategies.
Zaheen et al., [4]	He reviewed pathophysiological mechanisms, emerging factors, and biomarkers associated with myocardial infarction in young individuals.	Narrative revision.	Genetic, inflammatory, and metabolic factors, biomarkers, and mechanisms involved in early-onset myocardial infarction (MI).	Need for prospective studies; lack of standardization of the biomarkers evaluated.	Myocardial infarction (MI) in young adults has a complex and multifactorial etiology, involving early atherosclerosis, inflammation, metabolic changes, and genetic predisposition.

Source: Prepared by the authors based on selected studies (2026)

strategy among young adults with acute myocardial infarction, associated with the use of dual antiplatelet therapy, high-intensity statins, beta-blockers, and angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs), as recommended by contemporary guidelines. [10,11]. Less frequently, cases undergoing myocardial revascularization surgery have been described, mainly in the presence of complex multi-vessel disease, or treated conservatively, especially when there was no indication for immediate revascularization [12,13].

The main clinical outcomes assessed included hospital mortality, recurrence of cardiovascular events, heart failure, reinfarction, and need for repeat revascularization [11-13]. In general, studies have shown that young adults have lower in-hospital and short-term mortality rates compared to older populations, likely due to a lower burden of comorbidities and greater functional reserve [9,17]. However, the persistence of modifiable cardiovascular risk factors, especially smoking, obesity, dyslipidemia, and diabetes mellitus, was associated with a higher risk of recurrence of cardiovascular events, reinfarction, need for new revascularization, and development of heart failure during follow-up [1,11,12].

Of the studies included in the systematic review, eight were selected for detailed presentation in Table 1 because they represent the main evidence related to risk factors, clinical characteristics, treatment, secondary prevention, and outcomes of AMI in young adults. The remaining included studies were used in the narrative synthesis of the results.

Discussion

The findings of this systematic review demonstrate that acute myocardial infarction (AMI) in young adults aged 30 to 40 years presents distinct epidemiological, clinical, and prognostic characteristics compared to those observed in older individuals. In general, the included studies showed a predominance of modifiable cardiovascular risk factors, especially smoking, dyslipidemia, obesity, and a family history of early coronary artery disease, in addition to particularities in clinical presentation, therapeutic management, and long-term outcomes, corroborating recent evidence on the profile of early AMI [4,22]. These results reinforce the importance of early identification of individuals at higher risk, implementation of targeted primary and secondary prevention strategies, timely diagnosis, and longitudinal follow-up, with the aim of reducing the recurrence of cardiovascular events and improving long-term clinical outcomes [10].

Regarding risk factors, the included studies show that the development of acute myocardial infarction (AMI) in young adults results from the interaction between traditional cardiovascular risk factors, genetic predisposition, and accumulated behavioral exposures throughout life. Although systemic arterial hypertension, diabetes mellitus, and dyslipidemia remain important determinants of cardiovascular risk, recent evidence demonstrates a high contribution of potentially modifiable factors, such as smoking, obesity, sedentary lifestyle, inadequate diet, excessive alcohol consumption, and illicit drug use in the occurrence of early AMI [4,19,20]. Furthermore, psychosocial factors, including chronic stress, depression, and unfavorable socioeconomic conditions, have been recognized as relevant elements in the progression of cardiovascular risk in young adults, mainly due to their association with risky behaviors and lower adherence to preventive strategies [19,21]. These findings reinforce that a significant portion of the burden of cardiovascular disease in this population is related to modifiable factors, highlighting the importance of the early implementation of primary prevention measures, promotion of healthy lifestyle habits, and rigorous control of cardiovascular risk factors.

Another recurring aspect in the literature is the influence of genetic predisposition and family history of early coronary artery disease on the occurrence of acute myocardial infarction (AMI) in young adults. Recent studies demonstrate that individuals with a family history of premature cardiovascular disease have a higher risk of early coronary events, especially when associated with metabolic alterations, elevated lipoprotein(a) levels, and concomitant exposure to modifiable risk factors [23,24]. Furthermore, additional pathophysiological mechanisms, including prothrombotic states, persistent vascular inflammation, endothelial dysfunction, and metabolic alterations related to obesity and insulin resistance, have been described as relevant components in the genesis of early AMI, reinforcing the multifactorial nature of cardiovascular disease in young individuals [1,4].

Regarding clinical characteristics, most studies describe a predominance of males among young adults affected by acute myocardial infarction (AMI), although recent evidence indicates an increased occurrence of coronary events in young women, especially associated with the growing prevalence of obesity, diabetes mellitus, hypertension, and other cardiometabolic factors in this population [20]. Chest pain remains the main clinical manifestation of AMI; however, less typical presentations, such as dyspnea, fatigue, nausea, and epigastric discomfort, are more frequently observed among women and individuals with diabetes mellitus, and may contribute to delays in symptom recognition and the initiation of reperfusion therapy [10]. Furthermore, the lower perception of cardiovascular risk in young individuals, both by patients and healthcare professionals, may delay diagnostic investigation and compromise the early implementation of recommended therapeutic strategies [1,10].

Studies show that the therapeutic approach to acute myocardial infarction (AMI) in young adults largely follows the principles established for the general population, with primary percutaneous coronary intervention (PCI) remaining the main reperfusion strategy in eligible cases, associated with the use of dual antiplatelet therapy, high-intensity statins, beta-blockers, and renin-angiotensin-aldosterone system blockers when indicated [10]. However, considering the longer life expectancy of these patients and the potential for prolonged exposure to cardiovascular risk factors, secondary prevention plays a fundamental role, including cardiovascular rehabilitation, rigorous control of metabolic factors, smoking cessation, regular physical activity, and sustained adherence to pharmacological treatment [6,25]. Thus, individualized follow-up strategies are essential to reduce the recurrence of ischemic events and improve the long-term cardiovascular prognosis in this population.

Regarding clinical outcomes, the literature indicates that young adults with acute myocardial infarction (AMI) generally have lower in-hospital and short-term mortality compared to elderly patients, likely due to a lower prevalence of comorbidities, lower accumulated atherosclerotic burden, and greater cardiovascular functional reserve [11,19]. However, this apparent initial prognostic advantage does not eliminate the risk of complications during follow-up. Recent studies demonstrate that young individuals remain vulnerable to recurrence of ischemic events, the need for new coronary interventions, the development of heart failure, and impaired quality of life, especially when modifiable risk factors persist after the initial event [1,12]. Therefore, longitudinal follow-up, adherence to evidence-based pharmacological therapy, cardiovascular rehabilitation, and rigorous control of risk factors remain fundamental strategies for reducing

cardiovascular morbidity and mortality in this population.

The findings of this review have important implications for clinical practice and public health. Early identification of young individuals with a high-risk cardiovascular profile can favor the implementation of preventive measures before the occurrence of the first coronary event. Furthermore, health education campaigns targeting young adults can contribute to greater recognition of AMI symptoms and to early seeking of medical attention, reducing the time to diagnosis and treatment.

Despite the relevance of the available evidence, some aspects limit the interpretation and generalization of the results of this systematic review. The included studies presented significant heterogeneity regarding methodological design, sample size, criteria used to define young adults, profile of the populations evaluated, risk factors investigated, and clinical outcomes analyzed, making direct comparisons between findings and the performance of robust quantitative syntheses difficult [1,4]. Additionally, the predominance of observational studies among the available evidence limits the ability to establish definitive causal relationships between the identified risk factors and the occurrence of AMI, since these designs are more susceptible to selection biases, residual confounding, and limitations in assessing the methodological quality of the included studies [1,26]. Therefore, prospective multicenter studies with standardized inclusion criteria, age definition, and systematic evaluation of risk factors and outcomes are needed to broaden the understanding of AMI in young adults.

This systematic review highlights that acute myocardial infarction in young adults constitutes a growing public health problem, mainly associated with a combination of modifiable risk factors and individual predisposition. Recognizing the clinical particularities of this population can contribute to the development of more effective prevention, diagnosis, and treatment strategies, with the potential to reduce morbidity and mortality and improve clinical outcomes in individuals affected early by cardiovascular disease.

Given this scenario, it is recommended that future research prioritize prospective multicenter studies with standardized age criteria and long-term follow-up, allowing for a better understanding of the natural history of AMI in young adults, the influence of genetic and environmental factors, and the effectiveness of primary and secondary prevention strategies in this population.

Final Considerations

This systematic review revealed that acute myocardial infarction in young adults constitutes a significant public health problem, the incidence of which has increased in recent decades due to greater exposure to modifiable cardiovascular risk factors. Smoking, dyslipidemia, obesity, systemic arterial hypertension, diabetes mellitus, and a family history of early coronary artery disease stood out as the main factors associated with the occurrence of the event, while inadequate lifestyle habits, sedentary behavior, alcohol consumption, illicit drug use, and psychosocial stress also contributed to the increased cardiovascular risk in this population.

The studies analyzed demonstrated a predominance of males, a higher frequency of acute myocardial infarction with ST-segment elevation, and a high use of primary percutaneous coronary intervention as a reperfusion strategy. Although young adults generally have a better immediate prognosis and lower mortality rates compared to older patients, they remain susceptible to recurrent cardiovascular events, the development of heart failure, and impaired quality of life, especially in the presence of persistent risk factors and poor adherence to secondary prevention measures.

The heterogeneity of the included studies, especially regarding age criteria, methodological design, follow-up time, and outcomes assessed, limits direct comparison between results and reinforces the need for standardization of future investigations. Furthermore, there is a scarcity of prospective multicenter studies specifically focused on individuals between 30 and 40 years of age, highlighting a significant gap in scientific knowledge.

Thus, the findings of this review reinforce the importance of early identification of risk factors, implementation of primary and secondary prevention strategies, and longitudinal follow-up of these patients. Future studies with standardized methodology, longer follow-up periods, and evaluation of clinical and functional outcomes may contribute to improving strategies for the prevention, diagnosis, and treatment of acute myocardial infarction in young adults, reducing its clinical, social, and economic impact.

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