

**RISK FACTORS AND CLINICAL PROFILE OF YOUNG
PATIENTS WITH ACUTE MYOCARDIAL INFARCTION**

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ABSTRACT: *With significant epidemiological, etiological, and prognostic ramifications, acute myocardial infarction (AMI) in young adults is a unique and increasingly acknowledged clinical entity. Even while younger populations have a lower overall prevalence of AMI than older persons, recent decades have shown a worrying increase, especially in low- and middle-income nations. Young patients with AMI have a risk factor profile that is significantly different from that of older people. Modifiable factors like smoking, dyslipidemia, obesity, diabetes mellitus, and psychosocial stress are more common than non-traditional and emerging factors like substance abuse, thrombophilic disorders, inflammatory conditions, and genetic predisposition. Clinically, young individuals may have fewer comorbidities, less severe coronary artery disease, and a higher frequency of single-vessel involvement, although they frequently present with typical ischemia symptoms. Young people with AMI risk high long-term morbidity, repeated cardiovascular events, and major socioeconomic repercussions, even if their short-term prognosis are generally better than those of older patients. In order to identify knowledge gaps and emphasize the significance of early identification, aggressive risk factor modification, and targeted preventive strategies in this population, this narrative review summarizes current data on the epidemiology, risk factors,*

clinical characteristics, angiographic findings, and outcomes of AMI in young patients.

KEY WORDS: *Young adults; cardiovascular risk factors; smoking; dyslipidemia; diabetes mellitus; acute myocardial infarction; early coronary artery disease; lifestyle elements; Prognosis and clinical profile.*

INTRODUCTION: Although acute myocardial infarction (AMI) has historically been thought of as a condition affecting elderly adults, over the past 20 years, its prevalence in young people has drawn more attention. AMI in young patients is a distinctive subgroup with distinct clinical features, risk factor profiles, epidemiological trends, and prognostic implications. The relative burden of AMI is high because of early morbidity, long-term impairment, and major economic effect, even if the absolute incidence of AMI in this cohort is still lower than in older age groups.

In the context of AMI, the term "young" is defined differently in different studies, but it often refers to men who are 45 years of age or younger and women who are 55 years of age or younger, reflecting sex-based disparities in cardiovascular risk and illness onset. Although it makes direct comparisons between studies more difficult, this variation in age cut-offs consistently shows that AMI in young people is not an uncommon occurrence and may go unnoticed in clinical practice. Crucially, young patients frequently do not have all of the conventional comorbidities associated with older people, which can cause diagnosis delays, risk underestimation, and inadequate preventative measures.

Younger patients have a different etiological range of AMI than older groups. Non-traditional mechanisms like coronary artery spasm, spontaneous coronary artery dissection, thrombophilic states, substance abuse, inflammatory and autoimmune disorders, and genetic predisposition play a relatively larger role, even though atherosclerotic coronary artery disease is still

the most common cause. Furthermore, in this age range, lifestyle-related factors—such as tobacco use, physical inactivity, bad eating habits, and psychological stress—are very prevalent and frequently not sufficiently addressed.

From a clinical standpoint, young patients with AMI often exhibit typical ischemia symptoms, but they may also show better preserved left ventricular function at presentation, less widespread coronary artery involvement, and a higher proportion of single-vessel disease. The long-term prognosis is not good, even though the short-term survival is comparatively better than that of older patients. Early and aggressive secondary prevention is crucial since young survivors of AMI face decades of increased cardiovascular risk, repeated ischemia episodes, and a lower quality of life.

With a focus on risk factors, clinical profile, angiographic features, and outcomes, this narrative review attempts to thoroughly analyze the existing literature on AMI in young patients. This review aims to improve knowledge of this unique clinical entity and emphasize the need for specialized preventive and treatment approaches aimed at young people who are affected by or at risk of AMI by synthesizing the available data.

LITERATURE REVIEW: Acute myocardial infarction (AMI) in young adults is a unique clinical and epidemiological entity with features that differ from older populations, according to a growing corpus of cardiology research. Even though the absolute incidence of AMI among people under 45 is still lower than in older age groups, a number of studies show an increasing trend worldwide, especially in areas like South Asia and parts of Africa that are experiencing fast changes in their economies and lifestyles. This tendency is mostly caused by modifiable lifestyle variables, particularly smoking and dyslipidemia. In numerous cross-sectional and registry investigations, smokers consistently make up the biggest subset of young AMI patients.

While traditional cardiovascular risk factors are still important, their prevalence patterns differ between younger and older patient populations. Young adults who arrive with AMI are frequently more likely to have smoking, dyslipidemia (specifically, low high-density lipoprotein cholesterol and higher triglycerides), and a familial history of coronary artery disease (CAD). On the other hand, although diabetes mellitus, obesity, and hypertension are more prevalent in older persons, they are nevertheless major contributors in younger populations, especially in areas where socioeconomic shifts have raised the frequency of metabolic syndrome and obesity.

Male participants frequently make up more than 75–90% of cohorts in cross-sectional and observational studies of young AMI patients, while women are underrepresented in many series. However, milder symptom patterns and underestimate of risk may cause a delay in clinical diagnosis when young women do come with AMI. The left anterior descending artery (LAD) is the most often damaged vascular on angiography, and studies from tertiary centers have also shown that anterior wall myocardial infarction is often more common in younger patients. In contrast to the multi-vessel atherosclerotic burden commonly observed in elderly persons, younger cohorts frequently exhibit single-vessel disease or nonobstructive coronary disease.

Emerging and unconventional risk factors are also linked to young AMI, according to the literature. These include thrombophilic states, recreational drug use, psychosocial stressors, inflammatory diseases, and genetic predispositions such as familial hypercholesterolemia, which may be more significant in younger populations than in traditional models based only on age. Furthermore, although absolute incidence is still relatively low, younger patients are more likely than older counterparts to experience variations of myocardial infarction, such as infarction with non-obstructive coronary arteries (MINOCA) and spontaneous coronary artery dissection (SCAD).

Crucially, the long-term effects of premature AMI—such as repeated ischemia episodes, the development of heart failure, and a lower quality of life—remain a worry, even though younger patients generally have lower in-hospital mortality than older patients. Missed chances for early interventions and secondary prevention include delayed presentation to medical facilities and underdiagnosis of chest discomfort in younger people.

In conclusion, the evidence highlights a unique risk profile for young AMI that is dominated by smoking and modifiable lifestyle variables, with a relatively smaller atherosclerotic burden but a substantial long-term risk. To comprehend new etiological elements and improve prevention tactics aimed at this population, more research is required.

EPIDEMIOLOGY AND BURDEN OF AMI IN YOUNG ADULTS:

A significant percentage of instances of acute coronary syndrome worldwide are caused by acute myocardial infarction (AMI) in young adults. Studies regularly demonstrate that 10–25% of AMI occurrences occur among people under 45–55 years old, depending on the age category utilized, despite the fact that total AMI incidence is highest in older populations. Crucially, in many high-income nations, AMI rates have decreased among elderly persons; but, in younger age groups, this fall has been less noticeable or has stagnated.

Males make up the majority of young AMI patients; most registries show a male proportion of more than 70–90%. However, new information points to a comparatively higher incidence of AMI in young women, which is probably caused by an increase in metabolic risk factors and a lack of awareness of cardiovascular risk in this demographic.

Geographically, low- and middle-income nations have a disproportionately larger incidence of juvenile AMI due to the frequency of metabolic syndrome, smoking, and restricted access to preventative therapy. Premature AMI significantly increases long-term disability, lost years of productive life, and financial hardship in these areas.

All things considered, the epidemiological pattern shows that AMI in young adults is not uncommon, is impacted by cultural and lifestyle variables that may be changed, and is a developing public health issue rather than a singular clinical occurrence.

KEY RISK FACTORS IN YOUNG ADULTS WITH AMI:

Young persons with acute myocardial infarction have a different risk factor profile than older patients, with fewer age-related comorbidities and a preponderance of modifiable factors.

Over half of young AMI patients in most cohort's report smoking, making it the most common and potent risk factor. Because of its pro-thrombotic actions, endothelial dysfunction, and encouragement of plaque instability, which can cause infarction even in cases of mild coronary atherosclerosis, it plays a particularly significant role.

Elevated low-density lipoprotein cholesterol, low high-density lipoprotein cholesterol, and hypertriglyceridemia are the hallmarks of dyslipidemia, which is extremely common and frequently goes untreated before the index event. Early plaque development and rapid disease progression in a subgroup of patients are caused by familial hypercholesterolemia.

Young AMI patients are more likely to have metabolic risk factors, such as obesity, insulin resistance, and type 2 diabetes mellitus, which reflect changes in global lifestyle. Diabetes and hypertension are less common than in older populations, but when they develop early in life, they significantly hasten atherothrombosis and vascular damage.

Young adults are more likely than older patients to be affected by non-traditional factors such psychosocial stress, substance addiction (especially cocaine and stimulants), and a strong family history of early coronary artery disease.

All things considered, young AMI is primarily caused by changeable and controllable risk factors, underscoring a significant lost chance for early cardiovascular risk identification and prevention.

DISTINCT PATHOPHYSIOLOGICAL MECHANISMS IN YOUNG AMI:

Although the most common cause of acute myocardial infarction (AMI) in young adults is still atherosclerotic plaque rupture, the underlying disease process frequently differs in severity and behavior from that of older individuals.

In young individuals, coronary atherosclerosis is often less widespread but more physiologically active. Despite having little angiographic stenosis, plaques are prone to rupture because they are frequently lipid-rich and have thin fibrous caps. Acute coronary occlusion is facilitated by early endothelial dysfunction and a pro-thrombotic environment caused by smoking, dyslipidemia, and systemic inflammation.

Compared to older populations, a greater percentage of AMI in young adults is caused by non-atherosclerotic causes. Among them are:

Coronary artery spasm is often linked to stimulant usage or smoking.

Coronary artery dissection that occurs on its own, especially in young women

Microvascular dysfunction or transitory thrombosis associated with myocardial infarction with non-obstructive coronary arteries (MINOCA)

Familial hypercholesterolemia and thrombophilic diseases are examples of genetic and hereditary abnormalities that increase risk by promoting thrombosis or accelerating plaque formation at a young age.

In general, rather than the accumulating plaque burden characteristic of older patients, AMI in young adults represents a combination of accelerated atherosclerosis, increased thrombogenicity, and trigger events. Accurate

diagnosis and customized treatment depend on an understanding of these mechanisms.

CLINICAL AND ANGIOGRAPHIC CHARACTERISTICS:

Like older patients, young adults with acute myocardial infarction (AMI) typically present with typical ischemic chest discomfort. However, due to their advanced age and lack of comorbidities, there may be less initial clinical suspicion, which could cause delays in diagnosis and treatment.

ST-segment elevation myocardial infarction (STEMI) is comparatively more common in younger patients than in older populations, and electrocardiographic results are frequently simple. Left ventricular systolic function at presentation is often intact or very slightly diminished, and biomarker elevation follows standard patterns.

Young AMI patients exhibit unique patterns on coronary angiography. The left anterior descending artery is most frequently found to be the culprit vessel in single-vessel illness. A smaller percentage of patients have non-obstructive coronary arteries, which can be caused by causes like spasm, dissection, or microvascular malfunction. Multivessel coronary artery disease is less common.

In general, younger patients had a higher risk of acute thrombotic events on relatively minor coronary lesions but a less severe atherosclerotic burden. These traits highlight the necessity of aggressive secondary prevention while helping to explain the generally positive short-term results.

OUTCOMES AND PROGNOSIS:

Due in large part to fewer comorbidities, less severe coronary artery disease, and better preserved left ventricular function upon presentation, young persons with acute myocardial infarction (AMI) typically have better short-term results than older patients. This age group usually has reduced rates of in-hospital death and early complications including cardiogenic shock and progressive heart failure.

The long-term prognosis is not good, despite these positive early results. Young AMI survivors have an increased lifelong risk of heart failure, arrhythmias, progressive coronary artery disease, and recurrent myocardial infarction. The risk of adverse events is greatly increased by ongoing exposure to modifiable risk factors, including smoking and poor metabolic control.

Premature AMI has significant emotional and socioeconomic ramifications in addition to clinical effects. The fact that young patients frequently have lower quality of life, psychological anguish, and decreased productivity during their prime working years highlights the fact that the true impact of disease goes beyond death rates.

Overall, even while being young offers a survival advantage during the acute phase, long-term cardiovascular risk is still significant, highlighting the significance of ongoing secondary prevention and long-term monitoring.

IMPLICATIONS FOR PREVENTION AND CLINICAL PRACTICE:

Young people' acute myocardial infarction (AMI) reveals important gaps in the early detection and prevention of cardiovascular risk. There is a significant chance to stop premature occurrences with focused treatments because controllable risk variables predominate.

Early risk assessment should be prioritized in clinical practice, especially for young people who have a family history of premature coronary artery disease, dyslipidemia, obesity, diabetes, or smoking. Young age should not be a reason to postpone routine screening and aggressive management of these variables.

Secondary prevention is crucial after an index AMI. Reducing recurrent episodes requires long-term adherence to evidence-based medication, organized lifestyle modification, and cardiac rehabilitation. Psychosocial stressors and substance abuse, which are frequently disregarded but clinically significant in this population, should also be addressed by clinicians.

From a public health standpoint, to reduce the growing burden of premature AMI, especially in low- and middle-income countries, population-level measures emphasizing smoking cessation, a balanced diet, physical activity, and awareness of cardiovascular risk in young adults are required.

RESULTS:

Acute myocardial infarction (AMI) in young individuals is consistently linked to a different epidemiological and clinical profile when compared to older groups, according to an analysis of the published literature. Young patients account for 10–25% of AMI instances, with a significant male predominance, according to numerous observational studies and registry-based analyses.

Smoking, dyslipidemia, obesity, and a positive family history of early coronary artery disease are the most commonly detected risk factors; diabetes and hypertension are less common but have a disproportionately large influence when they are present. Younger cohorts are more likely than older patients to report non-traditional factors such substance addiction, psychosocial stress, and genetic susceptibility.

Studies' angiographic results consistently demonstrate a reduced burden of multivessel atherosclerosis and a higher incidence of single-vessel disease, which typically affects the left anterior descending artery. Non-obstructive coronary arteries are seen in a fraction of patients, which may be caused by MINOCA, coronary spasm, or spontaneous coronary artery dissection.

Long-term follow-up demonstrates a high risk of recurrent cardiovascular events and continued morbidity, especially in persons with persistent exposure to risk factors. Clinical outcomes show decreased in-hospital mortality and fewer acute complications in younger patients.

All things considered, the data shows that AMI in young adults is mostly caused by controllable risk factors, manifests as less severe coronary disease, and has positive short-term but worrisome long-term outcomes.

CONCLUSION:

With unique epidemiological, etiological, and prognostic features, acute myocardial infarction in young people is a clinically significant and increasingly acknowledged cardiovascular illness. Due to recurrent cardiovascular events, prolonged exposure to risk factors, and major socioeconomic impact, the long-term burden of disease remains large even though younger patients often have lower short-term mortality and less acute sequelae than older individuals.

According to the reviewed data, modifiable lifestyle-related risk factors—specifically, smoking, dyslipidemia, obesity, and psychosocial stress—are the main causes of premature AMI, frequently in conjunction with genetic susceptibility or metabolic abnormalities. With a higher frequency of single-vessel involvement and non-atherosclerotic processes leading to acute episodes, coronary artery disease in this cohort is usually less widespread but more unstable.

These results highlight the necessity of aggressive primary and secondary prevention methods, early identification of at-risk individuals, and long-term follow-up customized to the specific requirements of young patients. Reducing the lifetime cardiovascular burden associated with premature AMI requires a greater focus on lifestyle change, early risk factor screening, and adherence to evidence-based therapy.

In summary, treating acute myocardial infarction in young adults necessitates a change toward early prevention, increased clinical awareness, and ongoing post-event care, all of which have the potential to greatly enhance long-term results and lessen the increasing worldwide impact of premature coronary artery disease.

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