

Acute Cardiovascular Incidents in Young AdultsDr. Anurak Chaiyaporn¹, Dr. Suda Rattanakul²

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Abstract

Background: Cardiovascular disease is increasingly affecting young adults, largely driven by modifiable behavioral and metabolic risk factors. Early identification of determinants and gaps in awareness is essential to reduce premature morbidity and long-term cardiovascular burden.

Methods: A cross-sectional study was conducted among 140 young adults aged 18–45 years with acute cardiovascular events at a tertiary care center. Data on demographics, metabolic and lifestyle risk factors, psychosocial stress, awareness, and outcomes were collected and analyzed using SPSS. Chi-square and independent t-tests assessed associations, while multivariate logistic regression identified independent predictors of major adverse cardiovascular events. A p-value <0.05 was considered significant.

Results: The mean age was 37.4 ± 6.2 years, with 72.9% males. NSTEMI was the most common presentation (37.1%). Overweight or obesity was observed in 77.1%, dyslipidemia in 50%, hypertension in 44.3%, and smoking in 41.4%. High stress levels were reported in 38.6%, while 58.6% lacked adequate awareness of cardiovascular symptoms. Nearly 47.1% presented more than six hours after symptom onset. Independent predictors of MACE included smoking (AOR 3.1; p=0.002), obesity (AOR 2.8; p=0.006), dyslipidemia (AOR 2.6; p=0.004), high stress (AOR 2.4; p=0.01), and lack of awareness (AOR 3.4; p=0.001).

Conclusion: Acute cardiovascular incidents in young adults are strongly associated with modifiable metabolic, behavioral, and psychosocial determinants. Early screening, lifestyle modification, stress management, and improved awareness are critical to reducing premature cardiovascular risk.

Keywords: Young adults; Acute cardiovascular events; Smoking; Obesity; Dyslipidemia; Psychosocial stress; Awareness; Major adverse cardiovascular events.

Introduction

Cardiovascular disease (CVD) continues to be the leading cause of mortality worldwide, accounting for nearly 20 million deaths annually [1]. Although traditionally perceived as a condition affecting older adults, recent epidemiological trends indicate a rising incidence of acute cardiovascular events among young individuals aged below 45 years [2,3]. This shift carries major clinical and socioeconomic implications, as cardiovascular events occurring in early adulthood contribute to long-term disability, reduced productivity, and increased healthcare burden. Atherosclerosis begins early in life and progresses silently over decades before clinical manifestation [4]. The Framingham Heart Study demonstrated that traditional risk factors such as hypertension, dyslipidemia, diabetes mellitus, smoking, and obesity significantly influence lifetime cardiovascular risk even when present in young adulthood [5]. Similarly, the Coronary Artery Risk Development in Young Adults (CARDIA) study showed that risk factor accumulation in early adulthood predicts subclinical atherosclerosis and future coronary events [6].

Recent studies have reported stable or increasing hospitalization rates for acute myocardial infarction among young adults, particularly in the 35–44-year age group [2,7]. Unlike older populations, where age-related vascular degeneration predominates, acute cardiovascular events in young adults are more closely associated with modifiable lifestyle and metabolic factors. Obesity and metabolic syndrome have become increasingly prevalent due to sedentary behavior and dietary transitions toward processed, high-calorie foods [8]. Current ACC/AHA guidelines recommend aggressive lifestyle modification beginning in early adulthood to reduce lifetime cardiovascular risk [9]. Moreover, lifetime risk assessment models are preferred over short-term risk calculators in younger individuals, as conventional tools may underestimate disease burden [10].

Smoking remains one of the most significant and preventable contributors to premature cardiovascular events. Young smokers exhibit enhanced platelet reactivity and endothelial dysfunction, predisposing them to acute coronary syndromes [11]. Despite global tobacco control initiatives, tobacco use remains common in younger populations [12]. Psychosocial stress has also emerged as an independent risk factor. Chronic stress contributes to sympathetic activation, systemic inflammation, and endothelial injury, thereby accelerating atherosclerotic processes [14,15].

In addition to traditional atherosclerotic mechanisms, non-atherosclerotic causes such as spontaneous coronary artery dissection, myocarditis, and myocardial infarction with non-obstructive coronary arteries are more frequently encountered in younger patients [16–18]. These diverse etiologies highlight the complexity of acute cardiovascular presentations in this age group. Despite increasing disease burden, awareness of cardiovascular symptoms and preventive strategies remains inadequate among young adults. Delayed recognition and late healthcare seeking significantly worsen outcomes [19]. Strengthening cardiovascular literacy and promoting early screening are therefore essential components of prevention strategies. Given the convergence of metabolic risk factors, adverse lifestyle behaviors, psychosocial stressors, and limited awareness, acute cardiovascular incidents among young adults represent an evolving public health challenge. The present study was undertaken to evaluate the clinical profile, lifestyle determinants, awareness levels, and predictors of adverse outcomes among young adults presenting with acute cardiovascular events in a tertiary care setting, to inform targeted preventive and intervention strategies.

Materials and Methods

Study Design

This hospital-based cross-sectional study was conducted to evaluate the clinical profile, cardiovascular risk factors, lifestyle determinants, psychosocial influences, awareness of cardiovascular disease, and short-term outcomes among young adults presenting with acute cardiovascular incidents.

Study Setting and Duration

The study was conducted at Mae Fah Luang University, Thailand, over a period of one year. Consecutive eligible patients presenting to the Emergency Department or Department of Cardiology during the study period were enrolled.

Study Population

The study population consisted of young adults aged 18 to 45 years presenting with symptoms suggestive of acute cardiovascular events. The diagnosis was confirmed using electrocardiographic findings, cardiac biomarkers, echocardiography, coronary angiography, cardiac magnetic resonance imaging, or documented clinical diagnosis by a cardiologist. Both inpatient and outpatient cases were included in the study.

Sample Size

The study included all eligible consecutive patients presenting during the study period who fulfilled the

inclusion criteria. The sample size was determined based on the number of eligible participants available during the study period.

Inclusion Criteria

Young adults aged between 18 and 45 years with a confirmed diagnosis of an acute cardiovascular event who were willing to participate in the study and provide written informed consent were included.

Exclusion Criteria

Patients younger than 18 years or older than 45 years, those with pre-existing chronic cardiovascular disease diagnosed before the study period, a history of previous acute cardiovascular events, pregnant women, patients who opted for leave against medical advice, and individuals unable to provide reliable clinical information were excluded from the study.

Data Collection

Data were collected using a structured, pre-validated questionnaire and verified through hospital medical records. Information collected included demographic characteristics, anthropometric measurements for calculation of body mass index, medical history, cardiovascular risk factors, lifestyle behaviours including smoking, alcohol consumption, physical activity, and dietary habits, psychosocial stress levels, awareness of cardiovascular symptoms, time from symptom onset to hospital presentation, clinical findings, investigations, treatment received, and short-term clinical outcomes. Major adverse cardiovascular events were defined as the occurrence of cardiogenic shock, significant left ventricular dysfunction with an ejection fraction of less than 40%, clinically significant arrhythmias requiring therapeutic intervention, or in-hospital mortality.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of Mae Fah Luang University, Thailand (Ref. No. MFU/IEC/2024/45821). A detailed Participant Information Sheet was provided to all eligible participants, and written informed consent was obtained before enrolment. Confidentiality and anonymity were maintained throughout the study by assigning unique identification numbers to each participant and ensuring that all collected information was used solely for research purposes.

Statistical Analysis

Data were entered into Microsoft Excel for data cleaning and coding before being analyzed using the Statistical Package for the Social Sciences (SPSS) software. Categorical variables were expressed as frequencies and percentages, whereas continuous variables were presented as mean ± standard deviation. Associations between variables were analyzed using the Chi-square test for categorical data and the independent sample *t*-test for continuous variables. Multivariate logistic regression analysis was performed to identify independent predictors of major adverse cardiovascular events and poor short-term outcomes. A *p*-value of less than 0.05 was considered statistically significant.

Results

Table 1: Demographic Characteristics of Study Participants (n = 140)

Variable	Frequency	Percentage
Age 18–25 years	14	10.0%
Age 26–35 years	50	35.7%
Age 36–45 years	76	54.3%
Male	102	72.9%
Female	38	27.1%
Mean age	37.4 ± 6.2 years	—

More than half of the participants (54.3%) belonged to the 36–45-year age group, indicating clustering of events in the later phase of young adulthood. The mean age of 37.4 years reflects early manifestation of

cardiovascular disease. A strong male predominance (72.9%) was observed.

Table 2: Type of Acute Cardiovascular Event

Diagnosis	Frequency	Percentage
NSTEMI	52	37.1%
STEMI	36	25.7%
Unstable Angina	28	20.0%
Arrhythmias	14	10.0%
Myocarditis	10	7.1%

NSTEMI was the most frequent presentation (37.1%), followed by STEMI (25.7%). This indicates predominance of non-ST elevation acute coronary syndromes in young adults. A considerable proportion presented with unstable angina and arrhythmias, reflecting heterogeneous clinical manifestations. Myocarditis accounted for a smaller yet notable subset.

Table 3: Prevalence of Metabolic Risk Factors

Risk Factor	Frequency	Percentage
Overweight/Obesity	108	77.1%
Dyslipidemia	70	50.0%
Hypertension	62	44.3%
Diabetes Mellitus	48	34.3%

Overweight or obesity was present in 77.1% of participants, highlighting a substantial metabolic burden. Dyslipidemia affected half of the cohort, indicating early lipid abnormalities. Hypertension and diabetes were also prevalent despite young age. These findings emphasize clustering of cardiometabolic risk factors.

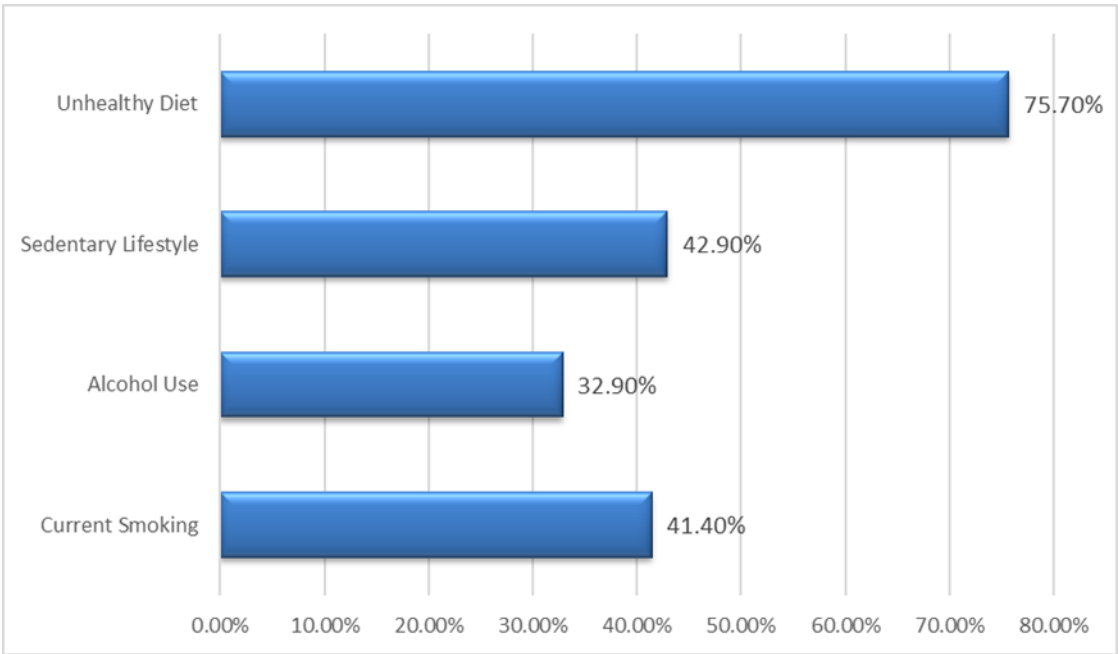


Figure 1: Lifestyle and Behavioral Risk Factors

Smoking was observed in 41.4% of participants, indicating a major preventable contributor. Nearly three-fourths reported unhealthy dietary patterns, reflecting poor nutritional habits. Sedentary behavior was common in 42.9% of individuals. These lifestyle factors collectively amplify cardiovascular risk at a young age.

Table 4: Psychosocial Stress and Awareness Levels

Variable	Frequency	Percentage
High Stress	54	38.6%
Moderate Stress	46	32.9%
Low Stress	40	28.6%
Inadequate Awareness	82	58.6%
Adequate Awareness	58	41.4%

High stress levels were reported by 38.6% of participants, indicating significant psychosocial influence. A majority (58.6%) lacked adequate awareness of cardiovascular symptoms.

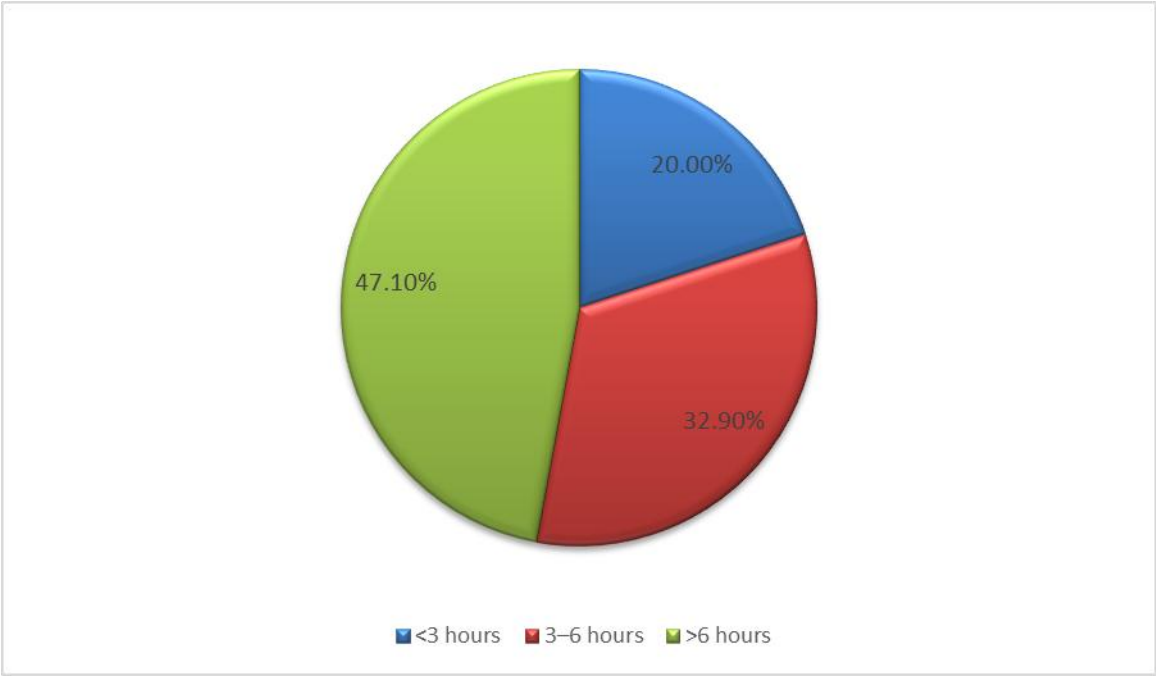


Figure 2: Time to Presentation After Symptom Onset

Nearly half (47.1%) of participants presented more than 6 hours after symptom onset. Only 20% sought care within the first three hours. Delayed presentation increases risk of myocardial damage and complications. This delay likely reflects inadequate symptom recognition and healthcare-seeking behavior.

Table 5: Multivariate Logistic Regression for Predictors of MACE

Variable	Adjusted Odds Ratio	95% CI	p-value
Smoking	3.1	1.5–6.4	0.002
Obesity	2.8	1.3–5.9	0.006
Dyslipidemia	2.6	1.4–5.1	0.004
High Stress	2.4	1.2–4.9	0.01
Lack of Awareness	3.4	1.7–6.8	0.001

Multivariate analysis identified smoking, obesity, dyslipidemia, high stress, and lack of awareness as independent predictors of major adverse cardiovascular events. Lack of awareness demonstrated the strongest association (AOR 3.4; p = 0.001). Smoking and obesity significantly increased the risk. These findings underscore the combined impact of metabolic, behavioral, and psychosocial determinants.

Discussion

The present study highlights a substantial burden of modifiable cardiovascular risk factors among young adults aged 18-45 years presenting with acute cardiovascular incidents. More than half of the participants

belonged to the 36 - 45year age group, indicating clustering of events in the later phase of young adulthood. Similar epidemiological patterns have been reported by Arora et al. [3], who demonstrated increasing hospitalization rates for myocardial infarction in individuals aged 35-44 years. Gupta et al. [7] also observed persistent prevalence of cardiovascular risk factors among young adults despite improvements in acute care outcomes. These findings collectively indicate a shifting epidemiological landscape where cardiovascular disease increasingly affects younger populations. A marked male predominance (72.9%) was observed in the current study. This observation is consistent with the findings of Amin and DeFilippis [2], who reported a higher incidence of acute myocardial infarction among young males. Bangalore et al. [18] similarly noted increased rates of percutaneous coronary intervention among young male patients. However, emerging literature suggests that cardiovascular risk among young women is also rising, particularly in relation to psychosocial stress and hormonal influences, as highlighted by Lichtman et al. [22]. These evolving gender dynamics warrant closer attention in preventive strategies.

Metabolic risk factors were highly prevalent in our cohort. Overweight or obesity was present in 77.1% of participants, while dyslipidemia and hypertension affected 50% and 44.3%, respectively. Tran and Zimmerman [1] emphasized that obesity and lipid abnormalities are dominant contributors to early cardiovascular risk in young adults. Furthermore, the Framingham study [4] established that early exposure to hypertension and dyslipidemia significantly increases lifetime cardiovascular risk. Juonala et al. [25] demonstrated that childhood and early adulthood risk factors strongly predict adult cardiovascular events. These data align with our findings, confirming that cardiometabolic clustering begins early and significantly influences acute presentations. Smoking was present in 41.4% of participants and independently predicted major adverse cardiovascular events (AOR 3.1; $p = 0.002$). This is comparable to the observations of Amin et al. [2], who reported high smoking prevalence among young myocardial infarction patients. The Tobacco Atlas [19] continues to report significant tobacco exposure in younger populations globally. Ambrose and Barua [11] described the mechanisms by which smoking promotes endothelial dysfunction, oxidative stress, and thrombogenesis, thereby accelerating plaque instability. Our findings reinforce smoking as a critical modifiable determinant of adverse cardiovascular outcomes.

Psychosocial stress was reported in 38.6% of participants and independently associated with adverse outcomes (AOR 2.4; $p = 0.01$). Steptoe and Kivimäki [14] demonstrated strong associations between chronic stress and cardiovascular disease through inflammatory and neuroendocrine pathways. Lichtman et al. [22] further showed that psychosocial factors significantly influence recovery and outcomes after myocardial infarction in young adults. These observations emphasize the importance of incorporating stress assessment into cardiovascular risk evaluation frameworks. Inadequate awareness of cardiovascular symptoms was identified in 58.6% of participants, and nearly half presented more than six hours after symptom onset. Lack of awareness independently predicted adverse outcomes (AOR 3.4; $p = 0.001$). The World Health Organization's noncommunicable disease action plan [15] emphasizes health literacy as a central pillar in reducing premature cardiovascular mortality. Lloyd-Jones et al. [5] also underscored the need for public education and early preventive interventions to mitigate cardiovascular risk. Delayed presentation remains a major contributor to poor prognosis in acute coronary syndromes.

NSTEMI was the most common presentation (37.1%), followed by STEMI (25.7%). Pasupathy et al. [16] highlighted the heterogeneity of myocardial infarction presentations in younger individuals, including non-obstructive coronary syndromes. Additionally, non-atherosclerotic causes such as spontaneous coronary artery dissection and myocarditis are increasingly recognized in younger populations [12,17]. These diverse etiologies underscore the need for comprehensive diagnostic evaluation in young patients. Multivariate regression analysis in this study identified smoking, obesity, dyslipidemia, high stress, and lack of awareness as independent predictors of major adverse cardiovascular events. Similar clustering of

behavioral and metabolic determinants has been emphasized in primary prevention guidelines [9,20]. Lloyd-Jones et al. [6] advocated for lifetime cardiovascular risk assessment in young adults, as short-term risk models often underestimate cumulative exposure.

Strengths

This study provides a comprehensive assessment of acute cardiovascular incidents among young adults by evaluating clinical characteristics, lifestyle factors, psychosocial determinants, awareness levels, and short-term outcomes within a tertiary care setting. The use of a structured, pre-validated questionnaire together with confirmation of diagnoses through standardized cardiovascular investigations enhances the validity and reliability of the findings.

Limitations

The cross-sectional single-center design limits the ability to establish causal relationships and may restrict the generalizability of the findings to other populations. Additionally, lifestyle behaviours and psychosocial factors were partly based on self-reported information, which may be subject to recall and reporting bias, and the absence of long-term follow-up precluded assessment of long-term cardiovascular outcomes.

Conclusion

The present study shows that modifiable metabolic, behavioral, and psychosocial factors largely drive acute cardiovascular events among young adults. Many participants had clustered obesity, dyslipidemia, hypertension, and smoking, indicating early cardiometabolic dysfunction. High psychosocial stress and poor awareness of cardiovascular symptoms contributed to delayed presentation and worse outcomes. Multivariate analysis identified smoking, obesity, dyslipidemia, high stress, and lack of awareness as independent predictors of major adverse cardiovascular events, fulfilling the study objective. Overall, cardiovascular disease in young adults reflects cumulative exposure to preventable risk factors, highlighting the need for early preventive strategies, age specific risk stratification, and integration of lifestyle and psychosocial assessment into routine care.

Recommendations

The study demonstrates that modifiable metabolic, behavioral, and psychosocial factors drive acute cardiovascular events in young adults. Clustering of obesity, dyslipidemia, hypertension, and smoking indicates early cardiometabolic dysfunction. Smoking, obesity, dyslipidemia, high stress, and poor awareness independently predicted adverse outcomes. These findings highlight the need for early prevention, targeted risk stratification, and routine lifestyle and psychosocial assessment to reduce premature cardiovascular morbidity.

Declaration

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Conflict of Interest: None declared

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