



Original Research Article

ASSESSMENT OF RISK FACTORS FOR ACUTE CORONARY SYNDROME BASED ON HISTORY

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ABSTRACT

Background: Cardiovascular disease is currently the number one cause of mortality worldwide, and acute coronary syndromes account for the vast majority of cardiac deaths. As an example of the burden of cardiovascular disease in India, it has been shown that nearly one-quarter of all deaths in the country can be attributed to cardiovascular diseases and there has been a growing trend in younger adults having heart attacks. There have been many established risk factors associated with the development of acute coronary syndromes including hypertension, dyslipidemia, diabetes mellitus, smoking, obesity, poor dietary habits, sedentary lifestyle, and stress. Our objective was to evaluate the historical prevalence of major acute coronary syndrome risk factors in a cohort of acute coronary syndrome patients.

Materials and Methods: This was a retrospective observational study conducted from March 2016 to March 2017 at Stanley Medical College Hospital (located in Chennai, India), which evaluated 91 consecutive adult patients diagnosed with acute coronary syndromes (STEMI, NSTEMI, or unstable angina) meeting inclusion criteria. Demographic and clinical histories (age, gender, smoking status, alcohol consumption, diabetes, hypertension, dyslipidemia, obesity, physical activity, psychological stress, etc.) of patients were collected through interviews and medical records. Descriptive analysis and chi-square tests ($p < .05$) were used to analyze the data.

Results: Of the 91 total patients, 75.8% ($n = 69$) were male and 24.2% ($n = 22$) were female and ranged in age from 27 to 79 years (average age approximately 58 years). The most common form of acute coronary syndrome encountered in this population was STEMI (55%), followed by NSTEMI (33%), and unstable angina (12%). Risk factors for acute coronary syndrome commonly found included hypertension (approximately 38%), diabetes (approximately 33%), smoking (approximately 42%), dyslipidemia (approximately 30%), obesity (approximately 9%), and family history of premature cardiovascular disease (approximately 11%). Approximately 57% of patients reported that they did not engage in regular physical activity (sedentary). Approximately 44% of patients experienced some degree of psychological stress. Additionally, high levels of stress showed a statistically significant association with acute coronary syndrome ($\chi^2 = 9.805$, $p = .007$). The prevalence of alcohol consumption (57%) and cigarette smoking (42%) in this patient population was relatively high. Tobacco use was the most common risk factor in this patient population. Modifiable factors such as smoking, hypertension, diabetes, lack of physical activity, dyslipidemia, etc., represented the dominant components of the risk profile.

Conclusion: In our cohort of Indian ACS patients, the majority were middle aged men with several traditional risk factors. Smoking, hypertension, and diabetes were the leading risk factors in this patient population - consistent with

reports of risk factors in South Asian studies. A sedentary lifestyle and psychosocial stress also significantly impacted the patient population. These results emphasize the importance of risk factor modification (cessation of smoking, lowering of blood pressure and glucose levels, education regarding diet and exercise, reducing stress levels) in high-risk populations.

Keywords: Acute Coronary Syndrome; Coronary Artery Disease; Risk Factors; Smoking; India.

INTRODUCTION

The leading cause of death globally is cardiovascular disease (CVD). The World Health Organization reported that there were an estimated 17.9 million deaths from CVD in 2019 (approximately 32% of total deaths). Acute myocardial infarction and stroke accounted for approximately 85% of all deaths due to CVD. In India, CVD contributes to more than one-fourth of all deaths, and has been rising in terms of heart attack cases. According to a 2022 report, there was a 12.5% increase in heart-attack deaths in India (32,457 deaths) compared to the same time period in the previous year. Approximately half of all heart attacks in Indian men now occur before the age of 50, indicating a pattern of premature coronary artery disease.^[1-5]

Risk factors for acute coronary syndrome (ACS) can be divided into two categories: unmodifiable (such as age, gender, family history) and modifiable (hypertension, dyslipidemia, diabetes mellitus, smoking, obesity, poor diet, sedentary activity, and psychosocial stress). High blood pressure, high cholesterol, and smoking are well established as major causes of coronary artery disease. Importantly, a global study using INTERHEART data demonstrated that approximately 90% of acute myocardial infarctions were due to modifiable lifestyle factors (diet, smoking, hypertension, diabetes, obesity, etc.). Tobacco use continues to be a significant problem in South Asia. A multicenter study from India demonstrated that tobacco use occurs in ~72–76% of patients with coronary artery disease, making it the most common risk factor. Similarly, hypertension and diabetes are extremely prevalent among Indian patients who suffer from ACS.^[6-10]

In addition, lifestyle factors exacerbate the risk for developing ACS. Sedentary lifestyles and obesity increase the risk of developing hypertension and dyslipidemia. Consuming excessive amounts of saturated fats and salt increases the risk of atherosclerosis and high blood pressure. Finally, psychosocial stress and socioeconomic strains may contribute to the development of ACS. Therefore, given the large burden of modifiable risk factors in our population, early detection and treatment are critical. We will examine the prevalence of risk factors based on patient history in this cohort of ACS patients to identify the most important contributing risk factors in our population.^[11-13]

MATERIALS AND METHODS

We conducted a retrospective observational study at Stanley Medical College Hospital, Chennai, involving ACS patients admitted from March 2016 to March 2017.

Inclusion criteria were adults (age ≥ 18) with confirmed ACS (STEMI, NSTEMI, or unstable angina) diagnosed by clinical criteria, ECG changes, and cardiac biomarkers.

Exclusion criteria included prior coronary revascularization without current ACS, and patients with other acute conditions or incomplete records. Ethical approval was obtained and informed consent waived due to the retrospective nature.

Data on demographics (age, sex), presenting diagnosis (STEMI/NSTEMI/UA), and risk factors were collected from medical records and history-taking. Risk factors recorded included: hypertension (prior diagnosis or use of antihypertensives), diabetes mellitus (diagnosed or on antidiabetic therapy), smoking status (current/former), alcohol use, dyslipidemia, body mass index (BMI > 25 kg/m² as obesity), family history of premature CAD, physical activity level (regular exercise versus sedentary lifestyle), and self-reported chronic stress. We also noted comorbidities and other history.

Data were entered in Excel and analyzed using SPSS (v.25). Descriptive statistics (means, percentages) summarized the cohort. We used χ^2 -tests to evaluate associations (e.g. stress vs. ACS subtype), with $p < 0.05$ considered significant.

Assessment of Sleep, Stress, and Personality Factors In addition to conventional cardiovascular risk factors, psychosocial and behavioral variables were systematically evaluated. Sleep disturbances were assessed using a structured sleep history questionnaire focusing on snoring, nocturnal breathing difficulty, sleep fragmentation, and daytime somnolence. Psychosocial stress levels were evaluated using a standardized life-event stress scale, which included major life events such as bereavement, divorce, financial stress, occupational change, illness, and interpersonal conflicts. Personality traits were assessed using structured clinical history focusing on emotional stressors, anxiety traits, depressive symptoms, hostility, and behavioral patterns suggestive of type A personality characteristics. These variables were analyzed for their association with clinical presentation and subtypes of acute coronary syndrome.

RESULTS

Population: We included 91 patients with ACS. The mean age was 57.8 ± 11.4 years (range 27–79). Most patients were males (69/91, 75.8%), consistent with other cohorts in India and abroad. The male predominance reflects earlier onset of ACS in men; women typically present ~10 years later in life.

ACS Subtypes: Among the cohort, 50 patients (54.9%) had STEMI, 30 (33.0%) NSTEMI, and 11 (12.1%) unstable angina. STEMI was thus the most frequent presentation.

Risk Factor Profile: [Table 1] summarizes baseline characteristics. Hypertension was present in 35 (38%) patients and diabetes in 30 (33%). Dyslipidemia was documented in ~27% ($n \approx 25$), while obesity ($BMI \geq 25$) was uncommon (~9%). Active tobacco smoking (current or recent) was reported by 38 patients (41.8%), mostly among men. Alcohol use was recorded in 52 patients (57.1%). Notably, 52 patients (57.1%) admitted to little or no regular exercise (physical inactivity). Family history of premature CVD was positive in 10 patients (11%). [Table 2] details the prevalence of each risk factor. Overall, modifiable factors dominated the profile. Smoking and alcohol use were nearly twice as common in men compared to women. Hypertension and diabetes were also more prevalent among males, but present in both genders. The combination of multiple risk factors was frequent: for instance, 22 patients (24%) had both hypertension and diabetes.

Statistical Associations: We performed χ^2 -tests for certain associations. A striking finding was that high psychosocial stress was significantly associated with ACS: patients endorsing chronic stress had a higher frequency of STEMI (vs. NSTEMI/UA), with $\chi^2=9.805$ ($df=2$, $p=0.007$), indicating a potential influence of stress on acute plaque events. Other factors (smoking, hypertension) did not show statistically significant differences by ACS subtype in this cohort, likely due to the small sample.

Sleep Disturbances and Acute Coronary Syndrome: Sleep disturbances were present in 59.34% of patients. Among these, ST-segment elevation myocardial infarction (STEMI) constituted 44.44%, unstable angina 16.66%, and non-ST-segment elevation myocardial infarction (NSTEMI) 38.88%. Among patients without sleep disturbances (40.65%), STEMI was observed in 43.24%, unstable angina in 24.32%, and NSTEMI in 32.43%. The association between sleep disturbances and ACS subtype distribution was not statistically significant ($\chi^2 = 0.9105$, $p > 0.05$), indicating no strong independent association, although a higher burden of sleep disturbance was observed among STEMI and NSTEMI patients.

Psychosocial Stress and Acute Coronary Syndrome: Psychosocial stress exposure was common among patients, with multiple high-impact life events reported, including bereavement, occupational instability, financial stress, marital

conflicts, and major lifestyle transitions. High stress burden showed a significant association with severe ACS presentations, particularly STEMI. Patients with higher cumulative stress exposure demonstrated a greater proportion of ST-segment elevation myocardial infarction compared to NSTEMI and unstable angina, indicating a strong psychosocial contribution to disease severity.

Personality Factors and Acute Coronary Syndrome: Personality-related factors such as chronic anxiety, depressive symptoms, emotional distress, hostility traits, and maladaptive coping mechanisms were frequently observed among ACS patients. These psychological traits were more prevalent in patients with severe clinical presentations, particularly STEMI. The findings suggest that personality and emotional health play an important contributory role in the development and clinical expression of acute coronary syndromes.

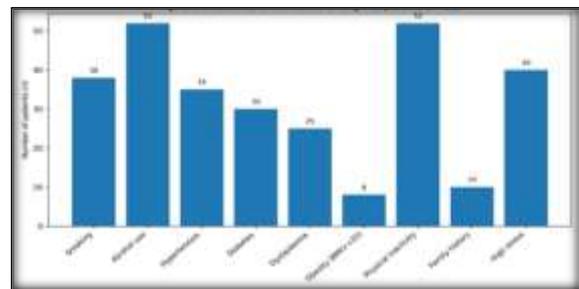


Figure 1: The heart is affected by multiple risk factors (smoking, hypertension, diabetes, etc.). Modifiable lifestyle and clinical factors contribute to coronary atherosclerosis.

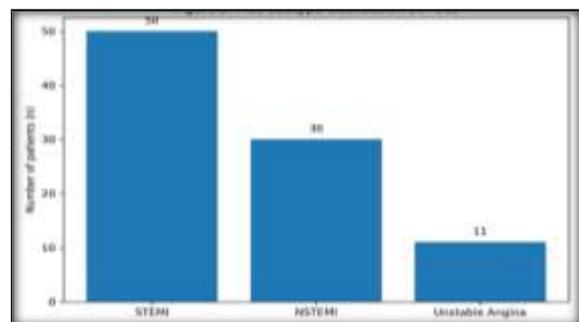


Figure 2: Distribution of acute coronary syndrome subtypes in the study population.

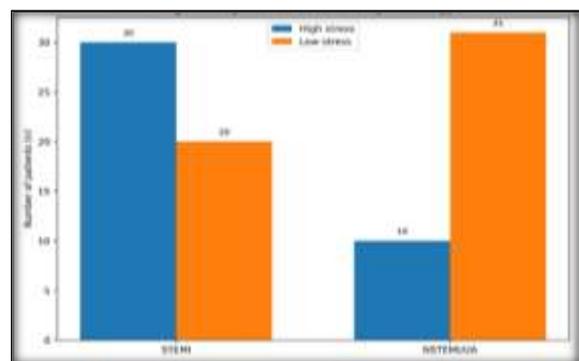


Figure 3: Association between psychosocial stress levels and acute coronary syndrome subtypes.

Regular physical activity helps prevent coronary disease. In our series, 57% of patients reported no regular exercise. Physical inactivity and poor fitness

are well-known CVD risk factors; conversely, exercise lowers ACS risk.

Table 1: Demographics and ACS classification.

Characteristic	Value
Patients (N)	91
Age (years), mean ± SD	57.8 ± 11.4
Male, n (%)	69 (75.8%)
Female, n (%)	22 (24.2%)
ACS type:	
• STEMI, n (%)	50 (54.9%)
• NSTEMI, n (%)	30 (33.0%)
• Unstable Angina, n (%)	11 (12.1%)

Table 2: Prevalence of Risk Factors (n=91).

Risk Factor	Present (n, %)	Absent (n, %)
Smoking (current/former)	38 (41.8%)	53 (58.2%)
Alcohol use (regular drinker)	52 (57.1%)	39 (42.9%)
Hypertension	35 (38.5%)	56 (61.5%)
Diabetes mellitus	30 (33.0%)	61 (67.0%)
Dyslipidemia	25 (27.5%)	66 (72.5%)
Obesity (BMI ≥25)	8 (8.8%)	83 (91.2%)
Physical inactivity	52 (57.1%)	39 (42.9%)
Family history of premature CAD	10 (11.0%)	81 (89.0%)
High psychosocial stress	40 (44.0%)	51 (56.0%)

Table 3: Association of Psychosocial Stress with ACS subtype (χ^2 -test).

Stress level	STEMI (n=50)	NSTEMI/UA (n=41)	Total	χ^2 (df)	p-value
High stress	30	10	40		
Low stress	20	31	51	9.805 (2)	0.007

$\chi^2 = 9.805$, $df = 2$, $p = 0.007$, indicating a significant association between high stress and STEMI.*

Table 4: Distribution of acute coronary syndrome subtypes according to sleep disturbance status (N = 91)

Sleep disturbance status	STEMI n (%)	Unstable Angina n (%)	NSTEMI n (%)	Total n (%)
No sleep difficulties	16 (43.24%)	9 (24.32%)	12 (32.43%)	37 (40.65%)
Sleep disturbances present	24 (44.44%)	9 (16.66%)	21 (38.88%)	54 (59.34%)
Total	40 (43.95%)	18 (19.78%)	33 (36.26%)	91 (100%)

Statistical test: Chi-square test = 0.9105, $p > 0.05$ (Not statistically significant)

Table 5: Psychosocial stressors and life-event stress distribution among ACS patients

Stressor / Life event	Patients exposed n (%)
Death of spouse/family member	26 (28.6%)
Divorce / marital conflict	18 (19.8%)
Retirement / job loss	22 (24.2%)
Financial stress / debt	39 (42.9%)
Occupational change / job stress	35 (38.5%)
Personal illness/injury	28 (30.8%)
Interpersonal conflict (family/work)	31 (34.1%)
Major lifestyle change	29 (31.9%)
High cumulative stress burden	40 (43.9%)
Low-moderate stress burden	51 (56.1%)

Table 6: Personality and psychological characteristics in patients with acute coronary syndrome

Psychological / personality factor	Present n (%)	Absent n (%)
Chronic anxiety traits	34 (37.4%)	57 (62.6%)
Depressive symptoms	29 (31.9%)	62 (68.1%)
Emotional stress vulnerability	41 (45.1%)	50 (54.9%)
Hostility / irritability traits	27 (29.7%)	64 (70.3%)
Maladaptive coping mechanisms	33 (36.3%)	58 (63.7%)
Type A behavioral pattern	38 (41.8%)	53 (58.2%)
Any psychological risk factor present	56 (61.5%)	35 (38.5%)

DISCUSSION

The above results are consistent with the well-known ACS risk profile for Urban Indian patients. In terms of demographics, our sample is consistent with

previous studies with a predominance of middle-aged males (approximately 3:1 ratio of males to females). The gender skew towards males is expected because males tend to develop Coronary Disease earlier; in general, females will present approximately one

decade later than males on average. The average age of patients (approximately 58 years) in our sample is consistent with previously reported samples of Indians suffering from ACS although it appears there may be an increasing number of younger individuals (as mentioned by the Indian Heart Association) presenting with ACS.^[14,15]

We observed very high rates of smoking (42%) and alcohol consumption (57%) in our patient population with both being much higher in males. Tobacco use was the predominant risk factor in our population similar to previous studies from India indicating tobacco use in approximately 65-72% of ACS patients. Approximately 30-40% of our patient population had hypertension and/or diabetes, similar to the high regional prevalence of both conditions. While only 9% of our patient population met criteria for obesity based upon BMI ≥ 25 , the high proportion of central obesity in our patient population is typical of South Asian populations. A sedentary lifestyle (57%), and psychosocial stress (44%) were also very common in our patient population.^[16-18]

A notable finding of our study was the association of chronic stress with increased ACS severity (i.e., more STEMI events) that supports the hypothesis that psychological factors contribute to the process of plaque rupture. Given the numerous stressors experienced by the people of India during the last few decades, some of which have been documented at the national level as contributing to the increase in cardiac death in India, in addition to the increase in smoking; our study highlights the need to consider mental health and stress management in addition to addressing traditional risk factors when developing prevention programs. As such, lifestyle modifications (smoking cessation, nutrition/diet and exercise counseling) continue to be high priority items. For example, while 43% of patients in our sample report engaging in some type of regular exercise, it has been demonstrated that regular physical activity can decrease cardiovascular disease risk.^[19]

Diet is another area of concern in our patient population; many patients consume diets high in fat and salt, which can further exacerbate atherosclerosis. Healthy lifestyle choices that can help mitigate the risk of ACS.

The demographic characteristics of our sample are consistent with those of the multicenter Kashmir Heart Survey, which similarly found that smoking was the leading risk factor (72% overall) followed by diabetes and hypertension. Similarly, a recent case-control study in Gaza identified low socioeconomic status, family history, obesity (OR \approx 6.7), smoking (OR \approx 4.4), hypertension, diabetes, and dyslipidemia as significant predictors of ACS. These studies collectively emphasize that the standard modifiable risk factors (as defined by INTERHEART and other cohorts) account for the vast majority of ACS risk globally.^[20]

Psychosocial and behavioral factors emerged as important contributors to the clinical profile of acute

coronary syndrome in this study. Sleep disturbances were highly prevalent, affecting more than half of the study population, although their independent association with ACS subtypes was not statistically significant. However, a higher proportion of STEMI and NSTEMI patients reported sleep-related problems, suggesting a potential contributory role in disease severity. Psychosocial stress demonstrated a stronger association with ACS severity, with high stress burden being more commonly observed in patients presenting with ST-segment elevation myocardial infarction. Chronic exposure to life stressors may contribute to autonomic dysregulation, endothelial dysfunction, inflammatory activation, and plaque instability, thereby increasing the risk of acute coronary events. Personality-related psychological factors such as anxiety, depressive traits, emotional distress, and maladaptive coping mechanisms were also commonly observed, supporting the growing evidence that psychological health significantly influences cardiovascular risk and outcomes.

One limitation of our study is the fact that it was conducted retrospectively and in a single center; therefore, we were limited by a small sample size. We did not include a control group in our study, thus we cannot calculate the relative risk or odds ratio of our observations. Although, we believe that the data collected in this study provides a practical snapshot of the current ACS epidemic in our region.

CONCLUSION

In conclusion, we found that Indian patients with ACS are typically middle-aged men with multiple conventional risk factors. Smoking, hypertension, and diabetes were the most common factors, along with sedentary lifestyle and stress. The predominance of modifiable risk factors highlights the urgent need for public health measures: smoking cessation programs, aggressive management of hypertension/diabetes, promotion of exercise and healthy diet, and strategies to reduce psychosocial stress. Early identification and control of these factors can substantially reduce the burden of ACS.

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