



## **Metabolic Risk Factors and Outcomes in Acute Coronary Syndrome**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors RA and HK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors RSS and MSB managed the analyses of the study. Author MSB managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Introduction:** CAD is the most common cause of mortality in India. It is a common multifarious public health crisis today and a leading cause of morbidity and mortality in both developing and developed countries. Hence, understanding the predominant risk factors among the Indian population is important.

**Materials and Methods:** This was a hospital based age and sex matched case control study, carried out at Government Medical College and Rajindra Hospital Patiala. A total of 100 patients of Acute coronary syndrome were studied. Patients and controls were enquired about the presence of cardiometabolic risk factors and the significance of association of these risk factors with the occurrence of Acute coronary syndrome was given by p value of <0.05.

**Results:** Majority of the cases were in the age group 61-70 years (32%) with male to female ratio of 1.25:1. Significant association was found between ACS and risk factors like smoking, positive family history of IHD, hypertension, diabetes, dyslipidemia, waist hip ratio and body mass index.

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Overall, most common outcome of ACS in the present study was NSTEMI (45%) followed by STEMI (35%) followed by Unstable angina (20%).

**Conclusion:** Significant association was found between smoking and occurrence of STEMI and significant association was found between Hypertension and occurrence of NSTEMI.

*Keywords: Acute coronary syndrome; risk factors; mortality.*

## 1. INTRODUCTION

CAD includes a spectrum of disease manifestation ranging from asymptomatic atherosclerotic disease to chronic stable angina to acute coronary syndrome. The term acute coronary syndrome (ACS) refers to any group of clinical symptoms compatible with acute myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina (UA) to non-ST elevation myocardial infarction (NSTEMI) to ST elevation myocardial infarction (STEMI) [1]. The risk factors for CAD are broadly classified as modifiable and nonmodifiable risk factors. Modifiable risk factors include hypertension, diabetes mellitus, dyslipidemia, obesity and smoking. Non-modifiable risk factors include age, sex, race, and family history for CAD [2]. CAD is closely related to life-style and modifiable physiological factors and risk factor modification has been shown to reduce cardiovascular morbidity and mortality. This study was undertaken to determine the association between various risk factors and ACS and also to study the outcomes of ACS in relation to these risk factors.

## 2. MATERIALS AND METHODS

The present case control study was conducted at Govt. Medical College and Rajindra Hospital Patiala after getting approval from the Institutional Ethical Review Committee. 100 patients of acute coronary syndrome irrespective of their age and sex, admitted in Emergency department or Intensive Cardiac Care Unit of the Medicine Department of Rajindra Hospital Patiala were included in the study as cases. All patients with a previous history of CAD and also those who were taking lipid lowering drugs were excluded to remove elements of confounding. Also the patients having severe co-morbid conditions like end stage renal disease, chronic liver disease, hypothyroidism, terminally ill respiratory disease and malignancy were excluded from the study. Age and sex matched healthy subjects not having coronary artery disease were taken as controls. The diagnosis of ACS was made on the basis of clinical features,

electrocardiogram (ECG) abnormalities and cardiac injury enzymes as described by Leupker et al. [3]. A detailed history of patients about chest pain, palpitations and sweating, ghabrahat, orthopnea, PND and dyspnea was taken. Drug history including use of anti-hypertensive drugs, anti-diabetic drugs, anti-platelet therapy, anti-coagulant therapy, use of NSAIDs, use of lipid lowering agents, anti-arrhythmic drugs was also enquired in detail. Past history of any similar episode and/or hospital admission due to similar cause was taken. Descriptive statistics was done for all data and were reported in terms of mean, S.D and percentages. Appropriate statistical tests of comparison were applied. Categorical variables were analyzed with the help of chi-square test. Statistical Significance was taken as p value <0.05. The data was analyzed using SPSS version 22 and Microsoft Excel.

## 3. RESULTS

Overall, most common age group in patients presenting with ACS was of 61-70 years (32%) followed by age group of 51-60 years (26%). Significant association was found between ACS and risk factors like positive family history of IHD (p value 0.011), smoking (p value was 0.041), BMI (p value 0.003), WHR (p value 0.001) and dyslipidemia. In the present study hypertension was found in 56% cases as compared to 28% controls, p value was <0.001 (highly significant). Diabetes was found in 49% cases as compared to 32% in control group, p value was 0.014 (significant). The most common outcome of ACS was NSTEMI (45%) followed by STEMI (35%) followed by Unstable angina (20%). In the present study, significant association was also found between smoking and occurrence of STEMI and hypertension with occurrence of NSTEMI.

## 4. DISCUSSION

In this case control study, risk factors showing significant association with ACS were identified. In the present study majority of the cases (32%) were in the age group of 61-70 years and mean age of the cases was  $60.44 \pm 12.84$ . This was

**Table 1. Shows the summary statistics for different risk factors in case and control groups**

Risk factor	Level	Cases (n=100)	Controls (n=100)	p-value
<b>Age(yrs)</b>	31-40	8	12	0.047
	41-50	18	26	
	51-60	26	36	
	61-70	32	15	
	71-80	7	6	
	81-90	9	5	
<b>Sex</b>	Male	56	55	0.887
	Female	44	45	
<b>f/h/o IHD</b>	Yes	30	15	0.011
	No	70	85	
<b>Smoking</b>	Yes	28	16	0.041
	No	72	84	
<b>BMI</b>	18.5 - 24.9 Kg/m <sup>2</sup>	24	45	0.003
	25.0 - 29.9 Kg/m <sup>2</sup>	64	51	
	≥ 30.0 Kg/m <sup>2</sup>	12	4	
<b>WHR</b>	Normal(females<0.90 Males<0.85)	48	71	0.001
	Abnormal((females>0.90 Males>0.85)	52	29	
<b>HTN</b>	Yes	56	28	<0.001
	No	44	72	
<b>DM</b>	Yes	49	32	0.014
	No	51	68	
<b>TCh</b>	≤200 mg%	42	85	<0.001
	>200 mg%	58	15	
<b>LDL</b>	≤130 mg%	58	74	0.017
	>130 mg%	42	26	
<b>HDL(F)</b>	<50 mg%	27	21	0.164
	≥50 mg%	17	24	
<b>HDL(M)</b>	<40 mg%	21	11	0.042
	≥40 mg%	35	44	

**Table 2. Shows distribution of cases according to outcomes of ACS (NSTEMI/STEMI/Unstable angina)**

NSTEMI	45
STEMI	35
Unstable angina	20
Total	100

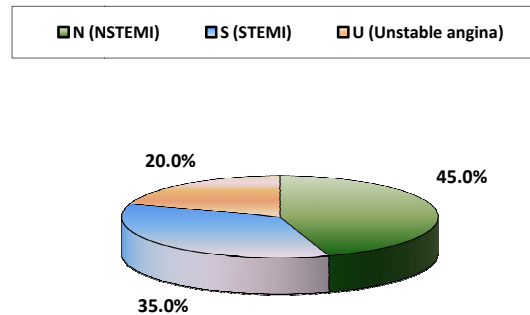
comparable to study conducted by Ahmad et al. [4] where the mean age of ACS in elderly was  $56.9 \pm 8.7$  years. Significant association was found between positive family history of ischemic heart disease (30% cases) and occurrence of ACS. This was comparable to the findings of study conducted by Sharma et al where positive family history was found in 50% of cases [5]. Study by Ahmad et al observed positive family history of IHD in 30% cases [4].

In the present study 28 cases (28%) were smokers as compared to control group where 16% were smokers, p value of 0.041 was obtained which was statistically significant. The

present study observed smoking to be significantly associated with risk for ACS. This observation was supported by studies carried out by Babu et al. [6] and Yusuf et al. [7].

The present study observed that anthropometric parameters like BMI and WHR were strongly associated with the diseased groups. Yusuf et al. [7] and Pais et al. [8] also support this observation in their studies.

The present study also observed significant association of risk factors like Hypertension and Diabetes mellitus with acute coronary syndrome. In our study we observed that 56 cases of ACS



**Fig. 1. Distribution of cases according to outcomes of ACS**

(56%) were hypertensive which is comparable to studies by Ahmad et al. [4], Yusuf et al. [7] who reported hypertension in 69.3% and 39.02% cases respectively. In the present study, diabetes was found in 49 cases (49%). The finding was comparable to studies by Yusuf et al. [7] and Ahmad et al. [4]. Dylipidemia is a well established risk factor for ACS. In our study also we observed that dylipidemia has a strong association with ACS. This was comparable to findings of Dali B et al. [9].

In this study out of total 100 cases of ACS; 45% had NSTEMI, 35% had STEMI and 20% had unstable angina. Another study conducted by Udaya Ralapanawa et al. [10] observed that 37.7% had unstable angina, 36.7% NSTEMI and 25.7% had STEMI. Still in another study by KJ Raihanathul Misiriya et al. [11] NSTEMI/UA was seen in 44.02% and STEMI in 55.98%.

On statistical analysis of the risk factors with outcomes of ACS our study observed significant association of smoking with STEMI. The findings of Udaya Ralapanawa et al. [10] support this observation where they also found significant association between smoking and STEMI. Another significant association was found between HTN and occurrence of NSTEMI. This is supported by findings of Udaya Ralapanawa et al. [10] who also found higher rates HTN in patients with NSTEMI.

## 5. CONCLUSION

Significant association was found between smoking and occurrence of STEMI and significant association was found between Hypertension and occurrence of NSTEMI.

## CONSENT

As per international standard or university standard written patient consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

The present case control study was conducted at Govt. Medical College and Rajindra Hospital Patiala after getting approval from the Institutional Ethical Review Committee.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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