# Clinical Profile and Angiographic Severity in Patients Presenting with Acute Coronary Syndrome

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## ABSTRACT

**Aim and objective:** To review the correlation between the clinical profile and the coronary angiographic vessel burden in patients with acute coronary syndrome that has been documented in the literature.

**Background:** The clinical profile and the atherosclerotic vessel burden need to be reviewed, regarding the risk factor and the severity of the coronary artery pathology it carries. The recent trends in the occurrence of metabolic comorbidities, the age of presentation of the primary cardiac event with its correlation with complications have to be taken into consideration from literature published so far to step up the nodal coronary care.

**Results:** Studies are done across revealing a male predominance with respect to coronary care events. Diabetes mellitus and systemic hypertension are the most common risk factors.

**Conclusion:** Diabetes is the single most common risk factor in most studies, involved with a multi-vessel pathology. With diabetes occurrence creeping into the third decade, the incidence of acute coronary syndromes has also begun in the younger age groups.

**Clinical significance:** The recent trends are very important to predict and prevent cardiac event-related morbidity and mortality. This can also provide small-time hospitals information to aid the local community, as the cardiovascular cause is the leading cause of death in the world.

**Keywords:** Acute coronary syndrome, Angiographic severity, Clinical profile of ACS, SYNTAX score.

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## INTRODUCTION

Cardiovascular disease is the leading cause of morbidity and mortality in India. Cardiovascular disease occurs in Indians 5–10 years earlier than in other populations. There has been an alarming elevation in cases of coronary artery disease and fatalities related to the former in developing countries. There have been studies in recent times which have led to the discovery that the Indian population is now genetically more susceptible to acute coronary syndrome more than the Western population.

Acute coronary syndromes represent the most common causes of mortality in patients with cardiovascular disease. Central pathogenesis consists of fissuring or erosion of atheromatous plaque with superimposed platelet aggregation and thrombosis. This is complicated by micro-fragmentation and distal embolization with alterations in vascular tone and ultimately partial or complete occlusion of perfusion to the affected myocardium. Clinical manifestations of ACS are dependent upon the severity of obstruction in the affected coronary artery, the presence or absence of collateral perfusion, and the volume and myocardial oxygen demand within the affected territory.

Complete coronary occlusion in absence of collateral perfusion results in ST-elevation myocardial infarction (STEMI), involving myocardial necrosis and accompanying increase in blood levels of sensitive enzyme markers. Transient or partial coronary occlusion results in non-ST-elevation myocardial infarction (NSTEMI), involving myocyte necrosis of a less extent and a minor increase in blood levels of enzyme markers. Unstable angina is caused by partial coronary occlusion without a rise in blood levels of myocardial enzyme markers.

UA was diagnosed with the presence of at least one of the following criteria: angina usually lasting for ≥20 minutes, onset

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within 1 month, or angina occurring within a crescendo pattern. Patients with UA also had a minimum of one among the subsequent electrocardiogram (ECG) findings: ST-segment depression ≥0.5 mm or T inversion ≥0.3 mV in any two leads. Non-ST-elevation myocardial infarction was diagnosed with the presence of elevated Troponin I levels as an indicator of myocardial necrosis additionally to other features of UA. ST-elevation myocardial infarction was diagnosed with the presence of clinical symptoms of MI lasting ≥30 minutes with ECG changes of either ST elevation of a minimum of 0.1 mV in two contiguous precordial leads or two limb leads.

Risk factors for acute coronary syndrome and cardiovascular pathology have been well elucidated which does not need repeated validation. The literature, however, is deficient in correlating the particular risk factor or factors to a certain type of acute coronary syndrome or event as explained above.

The angiographic severity of a particular patient is being calculated with the help of the SYNTAX (Synergy between PCI with TAXUS drug-eluting stent and Cardiac Surgery) which is a unique

tool to be done by a team that scores the complexity of the coronary artery disease.

## Review Results

### Clinical Profile and Angiographic Severity

A retrospective study was done at Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bengaluru, India by Sharma et al. correlated the clinical characteristics, angiographic profile, and in-hospital mortality in acute coronary syndrome in the South Indian population. One thousand five hundred and sixty-two patients of ACS were evaluated for risk factors, angiographic pattern and correlated the prognosis with the former. In this study, 1,242 patients were males and 320 were females, which amounts to two-thirds of the analyzed population. The most common coronary event was STEMI (995 patients), UA (390 patients), and NSTE-ACS (177 patients). The mean age of presentation was $53.28 \pm 11.54$ for males and $60.23 \pm 17.67$ for females. Five hundred and seventy-eight patients were diabetics and 628 were hypertensive. But the real risk factor came in the form of smoking which to no surprise was higher in males (770 patients), closer to 50%. Obesity, which was feared to be a silent risk factor in our Indian population amounted to 29.64% (463 patients). Angiographic profile was also evaluated. LAD artery was most commonly involved, followed closely by RCA and LCX arterial systems, with LMCA being involved the least in all 3 types of acute coronary syndromes (STEMI, NSTE-ACS, and UA). Among UA patients, 168 patients had SVD, 67 patients had DVD, TVD in 28 patients, LM disease in 12 patients, and normal vessels or non-significant lesions in 96 patients out of 371. In NSTE-ACS, 94 patients had SVD, 25 patients had DVD, 16 patients had TVD, and 2 patients had LM disease. In STEMI, 468 patients had SVD, 172 patients had DVD, 72 patients had TVD, 9 patients had LM disease, and non-significant disease in 184 patients out of 905 patients. The male sex had more percentages of disease effect in each category than females. Multivessel disease pathology was present in diabetics more than non-diabetics. In this study, 3 patients had a ventricular septal rupture, surprisingly all 3 were females. Cardiogenic shock was seen in a total of 45 patients, 11/320 female patients (3.44%) and 34/1242 male patients (2.73%). VT occurred in 8 patients of which 3 were females and 5 were males. Pulmonary edema occurred in 37 patients, 14 females and 23 males. According to this study, complications such as VSR, free wall rupture, heart failure, and cardiogenic shock were commonly seen in elderly female patients. Females have higher mortality than male patients, with higher mean age.[1]

In a prospective cohort study consisting of 100 patients conducted by Agrawal et al. from the Department of Cardiology, Banaras Hindu University, Varanasi, Uttar Pradesh, India. The median age was 58.9 and 27% was <50 years. Seventy-five percent were males. Only 27% reached the hospital within 6 hours. Sixty-five percent presented with STEMI. Forty-seven percent had SVD, 33% had DVD, and 20% had TVD. NSTE-ACS patients had more incidence of TVD than STEMI (31.4 vs 13.8%). Younger patients had more single-vessel involvement. Among gender, females had more extensive vascular involvement. Patients presenting with anterior RWMA had more severe KILLIPS classification than other arterial territory involvement. Among diabetics, only 4.3% had preserved LV ejection fraction.[2]

Varghese did a prospective observational study in St James College of Pharmaceutical Sciences, Chalakudy, Kerala. The sample size consisted of 125 participants admitted with an acute coronary syndrome, the clinical profile was correlated with the angiographic severity. But in this study, the most common risk factors were diabetes and hypertension (49.6 and 53.6%). Thirteen percent had prior aspirin use. Again the mean age of the patient was found to be higher under the NSTE-ACS group. SVD was predominantly found under the group of STEMI, whereas TVD was most commonly associated with NSTE-ACS.[3]

### Angiographic Severity Calculated by Syntax Score and Clinical Profile

Shah did a case-control study which was done at a tertiary care hospital, where 200 Asian patients were enrolled. Cases were diabetics between the age group of 35 years and 70 years on medications, while the control group consisted of non-diabetics with the same age group. After confirming acute coronary syndrome, these patients were scheduled to undergo a coronary angiogram and comparing the findings between the diabetic population and the non-diabetic population. The literature they reviewed stated that diabetics have more frequent involvement of LMCA, multivessel disease, as well as more calcified lesions. They also presented with more complicated atherosclerotic plaques with thrombosis. They observed various demographic characteristics as follows. In the case group, 69 were males. The mean age in the case was 58.91. The mean weight in cases was 64.83. The mean SYNTAX score in cases was 18.77 with an SD of 9.72. In diabetics, 60% had right dominance. Twenty-four percent of cases had total occlusion of a vessel. Eight percent of cases had trifurcation. Seven percent of cases had severe tortuosity. Twenty-one percent of cases had >20 mm as lesion length. Twenty-three percent cases had calcification. Eighteen percent of cases had thrombus. Forty-two percent of cases had diffuse involvement. Six percent had an aorto-ostial disease. Seventy-one percent of cases had proximal disease involvement. Twenty percent of cases had CTO. Three percent of cases had LMCA disease. Out of 100 cases, 52% had TVD, 31% had DVD, and 17% had SVD. Coming to controls, 82% were males. The mean age was 56.91 with an SD of 9.37. The mean weight was 64.37. The control group had a mean SYNTAX score of 13.16 with an SD of 8.01. Twelve percent had total occlusion of a vessel. Eighteen percent of controls had trifurcation. Twenty-five percent had bifurcation. Whereas 7% had severe tortuosity in diabetics, 17% were noted to have severe tortuosity. Eleven percent had disease length >20 mm. Eight percent had calcification. Surprisingly, 32% had thrombus in the non-diabetic population. Two percent had the aorto-ostial disease. Twenty-two percent had proximal vessel disease. Only 9% had a CTO. One percent had LMCA validating literature worldwide. In 100 cases of diabetics, 61 patients had scored from 0 to 22, 30 patients had scored from 23 to 32, and 9 patients had scored >33. Whereas in the non-diabetic population, 86 patients had a score between 0 and 22, 14 had scored between 23 and 32. And only one non-diabetic patient had scored >33.[4]

A comprehensive study was done in NRS Medical College, West Bengal by Saha et al., this was a cross-sectional descriptive-analytical study wherein 240 patients who presented with chest pain were studied. Coronary angiographic findings were studied in patients with diabetes mellitus and metabolic syndrome. This study population consisted of 82 diabetics, 68 patients with metabolic syndrome. Thirty-six patients had both. The mean age of presentation in this study was 55.27 =/− 10.76 years. Hypertensives were attributed to 37% of the study population and had a SYNTAX score of $20.98 \pm 14.17$ compared to non-hypertensives who had

14.09 ± 10.68. SYNTAX score to no surprise was again found to be higher in the smokers amounting to 17.00 ± 11.65, whereas 14.80 ± 11.97 in non-smokers. Smokers constituted 71.43% of the population. Those who had metabolic syndrome and diabetes had a SYNTAX score of 20.97 ± 9.32 than those who did not have both −13.16 ± 10.14. In this study, the correlation of Hba1C with SYNTAX score was also made. Patients with a high SYNTAX score (>33) were associated with higher values of Hba1C. Twenty-six patients with SS > 33 had Hba1C values of 6.88 ± 1.33. And those whose SS <22 had Hba1C of 6.42 ± 1.77. Again in this study, HDL levels were correlated with SS, and lower HDL levels −37.31 ± 5.07 were associated with SS > 33 (26 patients).[5]

Bharath and Gosavi studied the angiographic findings in diabetic and non-diabetic patients with cardiac symptoms. This study was done at Krishna Institute of Medical Sciences, Karad. This study was a case-control study. The case group consisted of 250 patients and the control group also consisted of 250 patients. These patients were subjected to coronary angiography, and the severity was calculated using SYNTAX scoring. In this study, there was male preponderance in both groups −52.8% of diabetics and 57.2% of non-diabetics were males. It was also observed that the ages 51–60 constituted a major bulk of the diabetics. Diabetics were also noted to have more incidence of severe left ventricular dysfunction (11.6%) compared to non-diabetics (4%). Severe LV dysfunction was defined as <30%. Both populations were then classified into normal, single-vessel disease, double-vessel disease, and triple-vessel disease. Diabetics to no surprise had a higher incidence of TVD (21.2%). Non-diabetics had more single-vessel involvement (51.6%). SYNTAX score of >30 was observed more frequently in diabetics (25.2%–63 patients). 22.8% of non-diabetics had a SYNTAX score of <10. This implied more severe and complicated coronary artery lesions in diabetics.[6]

## Discussion

There is a male predominance in acute coronary syndrome in possibly every study published globally. The recent trend of occurrence of cases has been in the slightly younger age group from 30 to 60 years. The most common acute coronary event was ST-elevation myocardial infarction. Diabetes mellitus and systemic hypertension are the two major risk factors. The SYNTAX score or the angiographic severity is more with a diabetic population which implicated more severe and complicated lesions. LMCA was found to be more commonly involved with diabetics. LAD was the most commonly involved coronary artery. Though angiographic atherosclerosis was more severe in diabetics, the occurrence of triple vessel disease was more in patients with NSTE-ACS. Diabetics also had more incidence of severe left ventricular dysfunction which in turn leads to the vicious cycle of repeated hospitalization for decompensated heart failure.

## Conclusion

Since diabetes and hypertensives are at a higher risk for developing a more severe angiographic atherosclerotic coronary picture, a more vigilant form of care needs to be provided for every patient with the above-said comorbidity. This also provides us with valuable input as to what to expect, to be prepared for every complication that arises in a patient with the acute coronary syndrome.

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