

Study of Demographic Profile, Risk Factors and Coronary Angiography Findings of Young Patients Presenting with Acute Coronary Syndrome

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Brief title: Acute Coronary Syndrome in Young Patients

Abstract: **Background:** The prevalence of acute coronary syndrome (ACS) focusing on clinical presentation and risk factors in young patients is poorly described and hence the risk factors contributing to ACS in young patients along with the clinical profile was evaluated in this study. **Material and Methods:** Total 215 patients with ACS admitted in tertiary care hospital of India were included in this prospective, observational study. For all the enrolled patients, detailed history with the risk factors and angiography parameters were analyzed. The study population was divided into two groups based on their age i.e., ≤ 30 years old and 31-40 years old and analysis was made according to these groups. Baseline demographics and procedural data were recorded for the study population. **Results:** Majority of the patients enrolled were male and prevalence of hypertension and diabetes was observed to be higher among 31-40 years patients. Majority of the smokers in the study population belonged to age ≤ 30 years (65.9%) and patients of both the age group had habit of chewing tobacco. Angiographic parameters revealed that the most involved coronary artery was left anterior descending artery among the enrolled patients and majority of them had single vessel disease. **Conclusion:** In the present study, significant differences were observed in coronary risk factors like hypertension, diabetes, smoking and type of myocardial infarction between young patients with age ≤ 30 years and 31-40 years old. Larger studies will be required to establish specific association among young population with ACS.

Keywords: Acute coronary syndrome; Coronary angiography; Demographics; Risk factors; Young adult

1. Introduction

Acute coronary syndrome (ACS) refers to a range of clinical indications characterized by acute ischemia related condition extending from unstable angina to myocardial infarction

with or without ST elevation that are auxiliary to acute plaque rupture or plaque erosion [1]. The ACS is a major cause of morbidity and mortality worldwide [2]. According to its prevalence in middle aged and elderly people, relatively few studies have focused on clinical presentation,

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and risk factors of ACS in young patients [3]. Young patients with ACS have unique characteristics with definite risk factors and clinical manifestation. In earlier studies, they have observed that sedentary lifestyle, obesity, and smoking were common risk factors in young patients. Diabetes and smoking in youthful patients may be a noteworthy chance for repetitive coronary occasions and mortality [4]. Although age is strongly influencing the risk and prognosis of ACS, few studies have examined the descriptive epidemiology of ACS in comparatively young population [2]. On comparison with older population, ST-segment elevation myocardial infarction (STEMI) is more common in young patients contributing to ACS in young patients and evaluate the clinical profile of patients with ACS.

2. Materials and Method

A single centre, observational study was conducted from January 2022 to December 2022 at a tertiary care centre in India. All patients under 40 years of age who presented with chest pain and ACS was diagnosed by electrocardiography were included in the study. Patients with congenital anomalies which lead to ACS were excluded from the study. A total of 215 patients were enrolled in the study. In the current study, the patients were enrolled into one of the two groups, i.e., ≤ 30 years old and 31-40 years old. All patients fulfilling inclusion criteria gave their informed consent for participation in the study. The study had been approved by the institutional ethics committee.

Data collection

Patients' clinical and demographic characteristics were collected by trained cardiac staff. Demographic variables included age and gender. Diabetes, hypertension, history of smoking, and tobacco use were considered as possible risk factors. During angiography, parameters like number of vessels involved and lesion location were evaluated. Locations of MI were also analysed.

Statistical analysis

The SPSS software version 15.0 was used for all statistical analyses. Categorical analyses were described as frequency and percentages. Continuous variables were presented as mean \pm standard deviation. Differences in baseline and clinical characteristics between age groups were compared using t-test and chi square test or fisher test. A p value of < 0.05 was considered statistically significant.

3. Result

In this observational study, 41 patients of <30 years of age, presenting with ACS were studied to observe their demographical, clinical, and angiographic profile and were compared for similar parameters of 174 patients belonging to age group 31-40 years. The mean age presentation for the group of patients aged < 30 years was 28.37 ± 1.6 years and for the patients aged between 31-40 years the mean age

compared to non-ST-segment elevation (NSTEMI) [4]. Acute coronary syndrome in very young patients have been poorly described [3]. Patients with ACS at a young age have a high risk for severe cardiovascular events and /or mortality in long-term follow up [4]. The incidence of ACS in young patients is escalating and thus necessitates comprehensive study to fill the knowledge gap by evaluating the risk factors and demographics of this population at risk.

In the present study, the patients were divided into two categories, with a goal to determine the risk factors

observed was 37.70 ± 2.5 years. Predominance of male gender was observed among both the group and for the same the numbers noted were 100% in young patients (<30 years) and 89.7% in older population (31-40 years). In patients with younger age (<30 years), 39% were hypertensive, 65.9% were smokers, 7.3% were diabetic, and 39% had habit of chewing tobacco while in elderly patients aged between 31-40 years 53.4% were hypertensive, 32.2% were smokers, 29.3% had diabetes, and 43.7% had tobacco chewing habit. The percentage of obese patients among the study population were observed to be higher in elderly population rather than the younger one i.e., 33.3% in elderly population and 22% in young population. (Table 1)

Table 1: The distribution of cardiovascular risk factors among two groups

Cardiovascular risk factors	Age ≤ 30 years (n=41)	Age 31-40 years (n=174)	p value
Age (years, mean \pm SD)	28.37 ± 1.6	37.70 ± 2.5	$<0.001^*$
Male, n (%)	41 (100%)	156 (89.7)	0.031*
Hypertension, n (%)	16 (39.0%)	93 (53.4%)	0.097
Diabetes mellitus, n (%)	3 (7.3%)	51 (29.3%)	0.003*
Smoking, n (%)	27 (65.9%)	56 (32.2%)	$<0.001^*$
Tobacco, n (%)	16 (39.0%)	76 (43.7%)	0.588
Obesity, n (%)	9 (22.0%)	58 (33.3%)	0.157

$p < 0.05$ was considered statistically significant

Table 2 shows the clinical characteristics of the two age groups. Compared to the patients belonging to age ≤ 30 years, the prevalence of Inferior wall STEMI was observed to be higher in people aged between 31-40 years, and the numbers observed were 34.5% while 73.2% i.e., thirty patients aged ≤ 30 years had anterior wall myocardial infarction. The proportion of patients with NSTEMI and unstable angina was highest among 31-40 years patients. On analysis of angiographic parameters, it was clear that maximum of the patients among both the age groups had single vessel disease with 33 patients belonging to ≤ 30 years age group and 114 patients among 31-40 years of age. However, the reduction in these numbers were noticed as the involvement of the culprit vessel increased. The most involved coronary artery noticed in the angiography was left anterior descending artery followed by right coronary artery.

Table 2: Clinical characteristics among two groups

Clinical characteristics			Age ≤ 30 year(n=41)	Age 31-40 year(n=174)	p value
MI location, n (%)	STEMI	IWMI	6 (14.6%)	60 (34.5%)	0.021*
		AWMI	30 (73.2%)	92 (52.9%)	
	NSTEMI		4 (9.8%)	8 (4.6%)	
	UA		1 (2.4%)	14 (8.0%)	
CAD, n (%)	SVD		33(80.5%)	114 (65.5%)	0.06
	DVD		8 (19.5%)	42 (24.1%)	
	TVD		0 (0%)	18 (10.3%)	
Vessel, n (%)	LAD		28 (68.3%)	81 (46.6%)	0.055
	LCX		1 (2.4%)	9 (5.2%)	
	RCA		4 (9.8%)	24 (13.8%)	
	LAD, LCX		0 (0%)	15 (8.6%)	
	LAD, RCA		7 (17.1%)	22 (12.6%)	
	LCX, RCA		1 (2.4%)	5 (2.9%)	
	LAD, LCX, RCA		0 (0%)	18 (10.3%)	

$p < 0.05$ was considered statistically significant. AAMI: Anterior wall myocardial infarction; CAD: Coronary artery disease; DVD: Double vessel disease; IWMI: Inferior wall myocardial infarction; LAD: Left anterior descending artery; LCX: Left circumflex artery; MI: Myocardial infarction; NSTEMI: Non-ST elevated myocardial infarction; RCA: Right coronary artery; STEMI: ST elevated myocardial infarction; SVD: Single vessel disease; TVD: Triple vessel disease; UA: Unstable angina.

4. Discussion

Although the incidence of ACS among subjects aged below 40 years is much lower when compared to older subjects. However, young patients require special attention, and developing an approach to the early diagnosis and identification of high-risk patients is a challenge for modern cardiology. Most of the patients (174) enrolled in study were aged between 31-40 years old. The most difficulty found in scientific literature as to ACS in young patients is the definition of which age should be used for evaluation.

When we evaluated the sex of patients, we observed an absolute predominance of males and the number noted was 100 % in patients aged <30 years while 89.70 % were male patients who belonged to age group 31-40 years. Similarly, in the research conducted by Avezum et al.[5] and Chuan Chan et al.[6] a higher number of male patients with ACS were observed.

The pathophysiology of ACS in young patients is expected to be different from the aged patients. The cascade of events occurring in the development of ACS initiates with rupture of the atherosclerotic plaque followed by the activation of the coagulation cycle and vessel obstruction. However certain risk factors like smoking, presence of cardiovascular disease, diabetes have been proven to contribute to the development of ACS. Cigarette smoking is a known risk factor for the development of cardiovascular risk disease Zimmerman et al.[7] found that among ACS patients <40 years old 73% to 90% reported a history of smoking. Also, research by Schoenenberger et al [3]in 2011 observed that the percentages of smokers was higher among patients less than 35 years of age (77.2%). A similar percentage (65.9%) of smokers were observed among the young population in our study.

Hypertension is less common in young patients with ACS than in older patients[8]. In the previous studies performed during 1970s and 1980s, approximately 14-30 % of young patients had hypertension[9]. More recent studies reported 45-83% prevalence of hypertension. The findings of our study state that the higher prevalence of hypertension was

noted in patients of old age (53.4%) on comparison with younger group. The findings from the study done by Schoenenberger et al[3] exhibited that more numbers of patients (57.7%) had hypertension and they belonged to age group >35 years when compared to young group.

In the recent study percentages of older patients who were overweight was much higher than those accounted for young population. A total of 22% patients with age ≤ 30 years were obese while 33.3% of patients were obese with age group 31-40 years. These results were found in consistence with the study performed by Schoeneberger et al[3]. Diabetes mellitus is also more widely associated with ACS in older patients than in young patients, less than 10% of whom have diabetes[8]. Similar results were observed in our study. The distribution of STEMI and NSTEMI was significantly different ($p < 0.021$) between young and older patients: 87.8% of young patients showed STEMI whereas this proportion decreased to 87.4% in patients with age group 31-40 years these results correlate well with the study done by Avezum in 2005 [5]which states that STEMI is more frequently in young patients, whereas this study contrast with NSTEMI results by stating that higher prevalence of NSTEMI is found in elder patients. However, in our study percentage of NSTEMI was found higher in young population (9.8%) compared to elder patients (4.6%)

Single vessel coronary artery disease was found more common than multi-vessel disease in young patients i.e., up to 80.5% had single-vessel disease, in our study. Similar results were found in Hong et al[10] study which states that single vessel disease is found more frequent among young population (56.9%) than in older population (47.0%).The LAD was the most involved artery for development in ACS among all age groups. In our study LAD was the culprit artery in 68.3% of patients belonging to age ≤ 30 years whereas 46.6% of patients between age group 31-40 years old. Study performed by Badran et al[11] showed similar findings where 71% of age <45 years ,64.5% of age between 41-65 years and 92% of age >65 years had involvement of LAD in development of ACS.

5. Limitations

The major drawback of this study is the small sample size. Also, this study analysed patients who reached the hospital, so it might not be a true representative of the population. Hence, the results cannot be generalized to the community. This study has primarily analysed relevant information with regards to the demographic and risk factor profile of ACS in young patients. However, a longer outpatient follow-up after discharge including information regarding various outcomes could have added more validity to our observations.

6. Conclusion

This study provides us with some insight into the incidence and risk factors associated with ACS and their presentation. Young ACS patients have different risk factors however, smoking was the most prevalent among all. Affected patients were predominantly male. STEMI and NSTEMI were noticed slightly higher in young population. Comparative analysis among SVD, LAD vessel was the most involved coronary artery among both the groups. Larger studies will be needed to assess specific association between clinical features of ACS in young population.

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References

- [1] Kumar A, Cannon CP, editors. Acute coronary syndromes: diagnosis and management, part I. Mayo Clinic Proceedings; 2009: Elsevier.
- [2] Sohan B, Hamsa Manasa K. Assessment of risk factors in young acute myocardial infarction patients.
- [3] Schoenenberger AW, Radovanovic D, Stauffer J-C, Windecker S, Urban P, Niedermaier G, et al. Acute coronary syndromes in young patients: presentation, treatment and outcome. International journal of cardiology. 2011;148(3):300-4.
- [4] Yagel O, Shadafny N, Eliaz R, Dagan G, Leibowitz D, Tahiroglu I, et al. Long-Term Prognosis in Young Patients with Acute Coronary Syndrome Treated with Percutaneous Coronary Intervention. Vascular Health and Risk Management. 2021:153-9.
- [5] Avezum A, Makdisse M, Spencer F, Gore JM, Fox KA, Montalescot G, et al. Impact of age on management and outcome of acute coronary syndrome: observations from the Global Registry of Acute Coronary Events (GRACE). American heart journal. 2005;149(1):67-73.
- [6] Chen TS-C, Incani A, Butler TC, Poon K, Fu J, Savage M, et al. The demographic profile of young patients (< 45 years-old) with acute coronary syndromes in Queensland. Heart, Lung and Circulation. 2014;23(1):49-55.
- [7] Zimmerman FH, Cameron A, Fisher LD, Grace N. Myocardial infarction in young adults: angiographic characterization, risk factors and prognosis (Coronary

Artery Surgery Study Registry). Journal of the American College of Cardiology. 1995;26(3):654-61.

- [8] Choudhury L, Marsh JD. Myocardial infarction in young patients. The American journal of medicine. 1999;107(3):254-61.
- [9] Jalowiec D, Hill J. Myocardial infarction in the young and in women. Cardiovascular clinics. 1989;20(1):197-206.
- [10] Hong MK, Cho SY, Hong BK, Chang KJ, Chung IM, Lee MH, et al. Acute myocardial infarction in the young adults. Yonsei Medical Journal. 1994;35(2):184-9.
- [11] Badran HM, Elnoamany MF, Khalil TS, Eldin MME. Age-related alteration of risk profile, inflammatory response, and angiographic findings in patients with acute coronary syndrome. Clinical medicine Cardiology. 2009;3:CMC. S2118.