Clinical and Angiographic Profile of Young Rural Indian Population Admitted with Acute Coronary Syndrome in a Tertiary Care Hospital

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ABSTRACT

Introduction: Cardiovascular risk factors, such as smoking, dyslipidemia, obesity, and family history of coronary artery disease (CAD), have been seen as more frequent among young ACS.The present study conducted to assess clinical and Coronary angiographic profile of young adults admitted with Acute Coronary Syndrome in a tertiary care hospital.

Material and methods: The present study is a cross-sectional hospital-based study conducted among 102 patients aged less than 45 years of age over a period of 1 year. All patients were subjected to Coronary Angiography after detailed clinical evaluation. Demographic data was collected. All patients underwent complete hematological and biochemical investigations and electrocardiograms. The data was analyzed in SPSS version 23 for windows. Quantitative data were presented as means and standard deviations. P value less than 0.05 was considered as statistically significant.

Results: In the present study total patients included were 102 of which 84.3% were males and 15.7% were females. Maximum patients (43.14%) were of age group 41-45 years with a Mean age of 39 years. Maximum risk for ACS in patients was from smoking (62.8%) followed by hypertension (39.3%) and diabetes mellitus (35.3%). No conventional risk factors were noted in 19% of patients required further evaluation for non-conventional risk factors. STEMI was diagnosed in 90.2% patients and NSTEMI diagnosed in 9.8% patients

Conclusion: The present study concluded that Acute coronary syndrome was common in males than females. Maximum patients were of age group 41-45 years with a Mean age of 39 years. Smoking was the commonest risk factor. STEMI was the most common clinical presentation of acute coronary syndrome with LAD being the most common culprit vessel.

Keywords: Cardiovascular Risk Factors, Smoking, Obesity, Coronary Artery Disease, Acute Coronary Syndrome.

INTRODUCTION

Acute coronary syndrome (ACS) is a clinical spectrum of the ischemic heart disease that includes unstable angina (UA), non-ST segment elevation myocardial infarction (NSTEMI) and ST segment elevation myocardial infarction (STEMI). ACS in older population (>45 years in male and >55 years in female) is relatively higher than in younger population.[1] Acute coronary syndrome (ACS) represents the most common mode of presentation of CAD.[2] Data indicate that Asian Indians are more prone to develop CAD with symptoms occurring a decade earlier than the western population.[3] It has been estimated that there could be around 30 million patients suffering from CAD in India.[4] Cardiovascular diseases (CVDs) and its associated complications alone accounts for approximately 12 million deaths annually in the Indian subcontinent.[5] Mortality due to coronary artery disease (CAD) is higher in South India.[5] Reports have shown that risk of CAD among Asian Indians is 3–4 times higher than white Americans, 6 times higher than Chinese, and 20 times higher than Japanese counterparts.[6] According to an estimate, more than half of death related to cardiovascular disease occurs in patients below the age of 50 years and one-fourth of acute myocardial infarction cases are being reported in patients under the age of 40 years.[7] In spite of limited data, it has been observed that the clinical and coronary angiographic profile is quite different in young patients as compared to those who develop CAD at an older age.[4] Apart from conventional risk factors, ST-segment elevation myocardial infarction (STEMI) in the very young (≤30 years) patients has been linked to substance abuse and nontraditional risk factors. Coronary angiographic data from various studies indicate preponderance of single-vessel disease or nonobstructive CAD in very young patients suffering from AMI.[8] The present study conducted to assess Coronary angiographic profile of young adults admitted with Acute Coronary Syndrome in a tertiary care hospital.

MATERIAL AND METHODS

The present study is a cross-sectional hospital-based study conducted among 102 patients aged less than 45 years of age over a period of 1 year. Before the commencement of the study ethical approval was taken from the Ethical Committee of the institute and written informed consent was taken from the patient after explaining the study. Patients were included in the study based on the diagnosis of STEMI according to the guidelines given by the Joint European Society of Cardiology (ESC)/American College of Cardiology

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Foundation (ACCF)/American Heart Association (AHA)/ World Heart Federation (WHF) Task Force.[6] ACS includes ST-segment elevation MI (STEMI), non-STEMI (NSTEMI), and unstable angina. The patients with a history of prior myocardial infarction or revascularization were excluded from the study. All patients were subjected to Coronary Angiography after detailed clinical evaluation. Information on age, sex, history of type-2 diabetes mellitus, hypertension, substance abuse, and family history of premature coronary artery disease (CAD) were obtained through self-report. Patients were classified as obese with BMI >25 kg/m². All patients underwent complete hematological and biochemical investigations and electrocardiograms. Dyslipidemia was defined as serum total cholesterol level (TC) of 200 mg/ dl, triglyceride (TG) > 150 mg/dl, low-density lipoprotein (LDL) > 130 mg/dl, high-density lipoprotein (HDL) < 50 mg/dl in women and <40 mg/dl in men and/or participants on lipid lowering treatment. Left ventricular ejection fraction (LVEF), regional wall motion abnormality (RWMA) and diastolic dysfunction were documented by echocardiography. Coronary angiography was performed using standard percutaneous techniques either via femoral or radial route after Allen's test. Angiographic severity was assessed in at least two orthogonal views using eye-balling. The obstructive CAD was defined as 70% lesion in one of the major epicardial arteries [viz., left anterior descending (LAD), left circumflex (LCx), and right coronary artery (RCA)], or their major branches, or 50% luminal narrowing of the left main coronary artery (LMCA). Accordingly, patients were further classified as suffering from single-vessel (SVD), doublevessel (DVD), or triple-vessel disease (TVD). All other lesions not amounting to the above-mentioned severity were grouped together as nonobstructive CAD. The data was analyzed in SPSS version 23 for windows. Quantitative data were presented as means and standard deviations. P value less than 0.05 was considered as statistically significant.

RESULTS

In the present study total patients included were 102 in which 84.3% were males and 15.7% were females. Maximum patients (43.14%) were of age group 41-45 yrs. Mean age of patients was 39 years. Maximum risk for ACS in patients was from smoking (62.8%) followed by hypertension (39.3%) and diabetes mellitus (35.3%). No conventional risk factors were noted in 19% of patients required further evaluation for non-conventional risk factors. STEMI was diagnosed in 90.2% patients and NSTEMI was diagnosed in 9.8% patients. AWMI was diagnosed in 65.7% patients followed by IWMI in 18.63% patients. Echo finding showed that 43.33% patients had normal ejection fraction, 33.33% patients had mid regional ejection fraction and 23.34% had reduced ejection fraction. MR was noted in 46.07% patients of which 76.59% were mild, 14.89% moderate and only 8% had severe mitral regurgitation. Majority of the patients (58.8%) had normal LV function at admission. LV dysfunction was noted in 41.2% patients of which 73.8% had mild LV dysfunction, 16.66% had moderate LV dysfunction

and 9.52% had severe LV dysfunction. Diagnostic Coronary angiogram revealed obstructive coronary artery disease in 96.1% patients and 3.95% patients were found to have normal coronaries. Coronary angiography revealed LAD (74.47%) was the most common culprit artery for acute coronary syndrome followed by LCX obstruction in 32.3% patients and RCA obstruction in 31.3% patients. Single vessel disease

Variables	N=102	%
Age in years (Mean±SD):	39.52±5.09	
Gender		
Male	86	84.3
Female	16	15.7
Coronary Risk Factors		
Hypertension	40	39.3
Diabetes Mellitus	36	35.3
Smoking	64	62.8
Hypercholesteremia	7	6.9
Tobacco Chewing	12	11.8
Alcohol	32	31.4
Chronic Kidney Disease	1	0.98
Obesity	3	2.9
Family History of CAD	11	10.8
No risk factors	19	19.4

Table-1: Demographic and risk factors profile of the patients

Angiography	N=102	%
Obstructive CAD	98	96.1
SVD	62	60.8
DVD	29	28.4
TVD	9	8.8
Percentage of individual coronary artery involvement:		
LAD	78	76.47
LCX	63	32.3
RCA	32	31.3
TVD+LMCA	2	1.96

Table-2: Coronary angiographic profile of the patients

Presentation	N=102	%
STEMI	92	90.2
1.AWMI	67	65.7
2.IWMI	19	18.63%
3.LWMI	1	0.98%
4.PWMI	1	0.98%
NSTEMI	10	9.8%
Mode of Management		
PTCA	78	76.47
1.Single stent	51	50
2.Double stent	27	26.5
CABG	9	8.73
Medical management alone	18	17.6
Final Outcomes among study population		
Discharged	99	97.1
In hospital mortality	3	2.9
Re infarction at follow up	6	5.9

Table-3: Clinical presentation, management and outcome of the study population

(SVD) was noted in 60.8% patients, double vessel disease (DVD) in 28.4% patients and triple vessel disease TVD in 8.8% patients. LMCA was involved only in 1.96% patients. Patients were given guideline directed treatment according to the institutional protocol. Percutaneous Angioplasty was done in 76.47% patients and only 8.73% patients required cardio-pulmonary bypass grafting. Medical treatment alone sufficed in 14.7% patients with successful recanalized culprit vessel following thrombolysis. Majority of the patients who underwent angioplasty required only single stent (65.38%) while two stents were required in 34.61% of patients. In hospital Mortality occurred in 2.9% of young patients admitted with acute coronary syndrome. After successful treatment 97.1% were discharged and advised regular follow-up. Reinfarction was noted in 5.9% of patients at follow-up

DISCUSSION

Indians have one of the highest rates of heart disease in the world. The disease also tends to be more aggressive and manifests at a younger age.[9] However, in our study, the mean age of presentation was 39.52±5.09 years. In a similar study conducted on 400 patients by Wadkar et al., clinical and angiographic profile of young patients with ACS showed males were 93% whereas female patients were 7%.[10] Young patients with significant coronary obstruction have less extensive disease than older patients. The present finding of predominantly single vessel disease in young patients and multivessel disease in older patients is in accord with previous studies.[11-13] In the our study 84.3% were males and 15.7% were females. In the study done by Prem Pais, et al the results showed that 95% of patients were male.[14] Male sex is one of the most consistently reported risk factors for CAD in many studies.[4,8,15] Protective effects of estrogens against atherosclerosis in females and high prevalence of smoking in males have been attributed for male preponderance.[8] In our study maximum risk for ACS in patients was from smoking followed by hypertension and diabetes mellitus. In the study by Sofia and EUROSPIRE for the survey on lifestyle and risk factors for coronary artery disease among European countries, hypertension was found to be a major risk factor for CAD although no statistical significance was found. In the present study of rural south Indian population hypertension as a contributory risk factor for coronary artery disease is next to smoking as majority of patients were from low socio-economic status with poor educational status. Lakka et al. in their study from population of Finland have reported that abdominal obesity is an independent risk factor for ACS in middle-aged men and combination with smoking, the risk of coronary events increases by 5.5 times.[18] in the current study involving rural population with poor nutritional status obesity is seen in only 2.9% of patients which is different from western and European population. In 19.4% of study population there were no traditional risk factors found implicating the need for study of nontraditional risk factors like anxious personality, work stress, passive smoking, air pollution etc. AWMI, as the most common STEMI pattern was diagnosed in 65.7% patients and was observed in other

studies as well.[8,19] Single-vessel involvement was most prevalent followed by double-vessel and triple vessel in a similar study from north India by Kumar et al. and Tewari et al.[19,20] The predominant vessel involved in younger age group is LAD which is in concordance with angiographic studies such as Badran *et al*.[22] and Ahmed Hussein.[23] However, Kennelly *et al*.[24] have found that RCA was the most common artery involved in their study done in 1982. There was very less involvement of TVD in the study by Jamil *et al*.[25] Many studies have shown LAD to be the vessel most commonly involved followed by RCA and LCX in young patients.[14,26] Angiographically recanalized culprit vessels with non-obstructive flow were present in 19.42% cases of STEMI, which have been attributed to complete recanalization whether spontaneous or post thrombolysis. This study indicates that an early presentation with thrombolysis within 12 hours were found successful with medical management alone indicating the importance of early pharmacotherapy as a sole modality of treatment Similar to the results of wadkar et al[10] from Mumbai. [27]Suresh G et al conducted a similar study among 4526 cases from south Indian rural population of Mangalore who underwent coronary angiogram between January 2008 and December 2014 of which 154 (3.40%) were <40 years of age with a mean (standard deviation) age of 36.51 (±3.654) years. In < 40 years age group, nearly third-fourth of the cases (112, 72.73%) had critical CAD; among them, 98 (87.5%) were male and 14 (12.5%) were female. About two-third of the cases (74, 66.07%) had SVD, followed by DVD (25, 22.32%) and TVD (13, 11.61%). This study concluded that incidence of critical CAD in young adults was quite high. Young patients with CAD were mainly males, and SVD was more common.[28] Deshmukh PP et al conducted a cross-sectional study in rural population of Nagpur, central India which included 41 patients of STEMI with a mean age of 27 ± 2.8 years. Risk factors were male gender (95.1%), dyslipidemia (51.2%), tobacco consumption (48.8%), obesity (34.1%), and smoking (29.3%). Anterior wall myocardial infarction (AWMI) was the most common presentation (82.9%) with obstructive CAD noted in 61% cases frequently due to LAD coronary artery involvement (46.4%).[29]Narayanaswamy AG et al conducted a retrospective study in rural population of Tamil Nadu, south India including 1152 patients. There were 121 (10.5%) patients with Coronary angiograms less than 45 years of age. Males were predominant 103/121(85.1%). The incidence of Single/Double vessel disease was nearly equal (39.6%/35.5%). 22 patients (18.1%) had recanalized coronary arteries (Non-Obstructive CAD). 80 patients (66%) were admitted with diagnosis of acute anterior wall myocardial infarction followed by inferior wall MI 31(37.8%). The predominant vessel involved was the left anterior descending artery (LAD) followed by right coronary artery (RCA). The results of the current study concluding male gender, smoking as common risk factor, STEMI being the most common presentation, SVD involving LAD as the most common culprit vessel is similar to the results of most other studies done in central, south and north India. The in-

hospital mortality among young patients with acute coronary syndrome was low (2.9%) in the current study when compared to study done by wadkar et al from Mumbai (8%). This low in hospital mortality was due to early diagnosis, prompt referral, availability of coronary care unit within reach serving the rural population round the clock with early reperfusion therapy. Early identification of individuals at risk for coronary artery disease by various screening programs with Patient education, improving general public awareness, primary prevention of risk factors like smoking, tobacco chewing, hypertension etc will help in further reducing the mortality and morbidity of young patients with coronary artery disease.

CONCLUSION

The present study concluded that Acute coronary syndrome was common in males than females. AWMI is the most common MI in young patients with LAD being the common culprit vessel. Maximum patients were of age group 41-45 yrs. with Mean age of 39 years. Smoking was the commonest risk factor. Recanalised coronaries were more common in patients receiving thrombolysis indicating that angioplasty or bypass is not required in all patient of myocardial infarction. Rapid detection of STEMI, prompt referral to coronary care unit and further reperfusion therapy will improve the overall outcome. Young patients with ACS will have better outcome when given early aggressive treatment. Primary prevention of risk factors like smoking, hypertension, diabetes mellitus, tobacco chewing, obesity should start from early period of life.

Abbrevations

LAD : Left anterior descending artery, LCX : left circumflex artery, RCA : right coronary artery, LMCA : left main coronary artery, STEMI :ST elevation myocardial infarction NSTEMI :non ST elevation myocardial infacrtion, SVD : single vessel disease, DVD : double vessel disease, TVD : triple vessel disease, PTCA : percutaneous transluminal coronary angioplasty, CABG : coronary artery bypass grafting, AWMI : anterior wall myocardial infarction, LWMI : lateral wall myocardial infarction, PWMI : posterior wall myocardial infarction, LV : left ventricle

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