Acute ST-Elevation Myocardial Infarction in Young in Shahid Gangalal National Heart Centre, Kathmandu, Nepal

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ABSTRACT

Background and Aims: Acute ST elevation myocardial infarction (STEMI) is often present in old populations. STEMI in young has significantly increased in recent years. We aim to study the conventional risk factors, clinical presentation, management and outcome of Acute STEMI in young patients.

Methods: Medical records of all the young patients (aged less than 45 years), who were admitted in our hospital with the diagnosis of Acute STEMI and treated in between 1st July 2015 to 30th June 2016, were retrospectively reviewed. Demographics, conventional risk factors, clinical presentation, management and outcome were recorded.

Results: There were total 1211 patients admitted for Acute STEMI, among them, 132(10.9%) were young patients, age ranged from 24 to 45 years with mean age 39.1±4.8 years, with 110 males. Anterior wall MI 50(37.8%) was the most common MI. Symptom onset to arrival to hospital ranged from 1 hour to 144 hours with mean of 19.4±2.4hours. Primary PCI was the mode of reperfusion in 59(44.6%) patients; thrombolysis was done in 19(14.3%) patients. The most common conventional risk factor was tobacco consumption; present in 91(68.9%) patients. Tobacco consumption was the only conventional risk factors in 27(20.4%) patients. There were four (4%) in-hospital mortality. Among the discharged patients all patients received Aspirin, Clopidogrel and Statin. Beta-blocker and Angiotensin converting enzyme inhibitor/Angiotensin receptor blocker were prescribed in 99(75%) and 96 (72.7%) patients respectively. Mean left ventricular ejection fraction was 45.5±8.6%, with 99(77.3%) having Ejection Fraction ≥40%.

Conclusions: Acute STEMI in young was common in male. Tobacco consumption was significant riskfactor. Acute STEMI in young has good prognosis.

INTRODUCTION

Over seven million people die every year from coronary heart disease, accounting for 12.8% of all deaths.[1]Myocardial Infarction(MI) is more common in older population as compared to younger adults,[2] however its incidence in young is increasing. The cutoff age of 45 is used in most studies to define young patients with Coronary Artery Disease(CAD) and myocardial infarction (MI).[2,3]Although MI in younger adults generally carry a favorable prognosis,[4] the disease carries a significant morbidity, psychological effects, and financial constraints for the person and the family when it occurs at a young age.

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We aim to investigate characteristics, clinical entity, coronary anatomy and prognosis of young STEMI.

METHODS

This was a retrospective, single center study, carried out in Shahid Gangalal National Heart Center (SGNHC). Medical records of all 132 patients aged above 18 years and below 45 years, who were admitted in our hospital with the diagnosis of Acute STEMI from 1st July 2015 to 30th June 2016, were retrospectively reviewed. Demographics, conventional risk factors (Hypertension, diabetes, dyslipedimia and Tobacco consumption), clinical presentation, management and outcome were recorded. Ethical approval for the study was obtained from Institutional Review Board of SGNHC.

Hypertension was defined as blood pressure >140 mmHg systolic or 90 mmHg diastolic on at least two occasions during hospital stay or history of hypertension diagnosed or on treatment. Diabetes was defined as having a history of diabetes diagnosed and/or treatment or fasting blood glucose greater than 7.0mmol/L. Dyslipidemia was defined according to NCEP-ATP III guideline, as history of dyslipidemia diagnosed or total cholesterol greater than 5.18 mmol/L, low-density lipoprotein greater than or equal to 3.37 mmol/L, or high-density lipoprotein <1.04 mmol/L. Tobacco consumption was defined as consumption of either cigarettes of chews tobacco. Definition of Extensive anterior wall MI if ST elevation is present in in leads I, aVl and V1-V6. Anterior wall MI if ST elevation in leads V1 to V6. Inferior wall MI if ST elevation in leads II, III and aVF. Inferior posterior wall MI was defined as II, III and aVF and tall R wave in V2 and V3 and ST depression in V2 and V3. Lateral wall MI if ST elevation in leads I and aVL.

Single vessel disease was defined if a patient had more than 50% stenosis in one of the major epicardial vessel, Double vessel disease if more than 50% stenosis in two major epicardial vessel, Triple vessel disease if more than 50% stenosis in all three epicardial vessel. Noncritical was defined if stenosis is less than 50%.

Descriptive statistics were used to describe the data. For categorical variables,frequencies and percentages were reported. Differences between groups were analyzed using Pearson's χ 2 tests. For continuous variables, means and standard deviations were presented and analyses were conducted using Student's t-test. A level of significance was set at the 0.05 level. Statistical analyses were conducted using SPSS version 20.0.

RESULTS

During the study period 1211 patients were admitted with diagnosis of acute STEMI at SGNHC. Among them, 132 patients were aged less than 45years which was 10.9% of total STEMI patients. Among 132 patients, 110 (83.3%) were male and 22 (16.6%) were female. Age ranged

from 24 years to 44 years with the mean age of 39.14± 4.8. Most of the patient were above the age 40 years details in Table 1. Patient's baseline blood parameters and Left Ventricular (LV) ejection fraction are summarized in Table 2. Minimum time from symptoms onset to presentation was within 1 hour and maximum was 144 hours with mean duration of 19±2.4 hours. Only 23(17.4%) patients presented within three hours of onset of symptoms, 27(20.4%) between three to six hours, 26(19.6%) between 6 to 12 hours, 56(42.4 %) presented beyond 12 hours. Extensive anterior wall MI was most common form of STEMI 50(37.9%), with lateral wall MI being least common (Details in Table 3). Tobacco consumption remained the most common risk factors seen in 91(68.9%) patients followed by dyslipidemia 60(45.5%), hypertension 39(29.5%), diabetes 34(25.8%) and positive family history 8(6%) as shown in table 4. Tobacco consumption and hypertension were more common in male whereas diabetes and positive family history were relatively higher in female patients but none were statistically significant as shown in table 5. As shown in Table six (5.3%) patients did not have any conventional risk factor, fifty two (39.4%) patients had 1 risk factor. Only two (1.5%) had four or more risk factors. Among the conventions risk factors, tobacco consumption was the only risk factors present in 27(20.5%) patients. Nineteen (14.4%) patients were thrombolysed with streptokinase or tenecteplase, 59(44.6%) patients underwent primary percutaneous intervention(PCI), whereas 54(40.9%) patients were managed medically as most of them had late presentation. Coronary angiography (CAG) was performed in only 70(53%) patients during the hospital stay. Single vessel disease was most common finding seen in 44(62.8%) patients, followed by double vessel disease 21 (30%), triple vessel disease 4 (5.7%) and one (1.4%) patient had non critical coronary artery disease as shown in table 7. Among the single vessel disease, left anterior descending artery (LAD) was most commonly involved vessel, seen in 23(32.8%) patients.

During the presentation to the hospital,six (4.5%) patients presented in cardiogenic shock, Seven (5.3%) patients had arrhythmias and required intervention, whereas eight (6%) of patients presented in heart failure. In hospital mortality was 4(3%). All patients at the time of discharged were on Aspirin, Clopidrogrel and Statin, Betablocker was prescribed in

99(75%), either angiotensin converting enzyme or angiotensin II receptor blocker was prescribed in 96 (72.7%) patients.

Table 1 Age wise frequency

Age groups	Frequency (%)
<25	1(0.8)
25-29	8(6)
30-34	11(8.3)
35-39	35(26.5)
40-44	77(58.3)

Table 2 Baseline parameters

	Max.	Min.	Mean
FBS(mmol/L)	15	3.8	6.24
Total Cholesterol(mmol/L)	9.5	2.4	4.42
LDL(mmol/L)	7.9	1.1	2.54
HDL(mmol/L)	1.3	0.8	1.09
LV ejection fraction (%)	65	20	45.5

Table 3 Forms of STEMI

	Numbers	Percentage
Extensive Anterior	50	37.9
Inferior	25	18.9
Anterior	22	16.7
Inferior Posterior	22	16.7
Lateral	1	0.8

Table 4 Risk factors among patients

	Number	Percentage
Hypertension	39	29.5
Diabetes	34	25.8
Dyslipidemia	60	45.5
Tobacco	91	68.9
Family history	8	6

Table 5 Gender wise distribution of risk factors

	Male (%)	Female (%)	Total (%)	P Value
Hypertension	34 (30.9)	5 (22.7)	39(29.5)	0.31
Diabetes	27(15.7)	7(31.8)	34(25.8)	0.32
Dyslipidemia	50(45.5)	10(45.5)	60(45.5)	0.59
Tobacco	78(70.9)	13(59.1)	91(68.9)	0.30
Family history	3(2.2)	5(3.7)	8(6)	0.3

Table 6 No. of risk factors in a patient

	Frequency	Percentage
0	7	5.3
1	52	39.4
2	49	37.1
3	22	16.7
4+	2	1.5

Table 7 CAG findings

Findings	Number(70)	Percent
Single vessel disease	44	62.8
LAD	23	32.8
LCX	9	12.8
RCA	12	17.1
Double vessel disease	21	30
LAD+LCX	10	14.2
LAD+RCA	6	8.5
LCX+RCA	5	7.1
Triple vessel disease	4	5.7
Non critical CAD	1	1.4

DISCUSSION

This is one of the very few study conducted in this group of patients with STEMI in Nepal. There are few important finding in this study which could be very useful in the management of the risk factors in the young population. It is a known fact that study of CAD and its risk factors in young individuals is important in the current era of preventive cardiology.[5] In this fast changing world, people's lifestyle especially those of young adults, are characterized by stress, overwork, unhealthy habits such as smoking, increased alcohol consumption, and eating high-fat or high-purine diets, which may lead to disturbances in the internal environment, such as coronary atherosclerosis, which leads to increase in incidence of coronary events such as STEMI.[6] Our study showed 10.8% of all STEMI patients are younger than 45 years old. This was slightly higher as compared with previous studies that have estimated that 5-10% of myocardial infarctions (MI) occur in patients younger than 45 years old.[7,8,9,10,11]

In our study, mean age of presentation was 39.14 years, which was in similar range with that to some recent studies done in Asian population. As studies done by Wong et al,[12]and Al Khadra et al,[13] showed mean age of 39.9, and 40 years. Our study showed 6.8% of patients were younger than 30 years which were slightly higher than few recent

studies by Vaidhya et al. (5.4%)[3], Tamrakar et al.(4.3%)[14] and Sricharan et al.(3.3%).[15]

This may be the sign of increasing trend of young patients developing CAD. Our studyshowed male predominance of 83.3% which was in similar range to almost all the studies done in young CAD patients worldwide,[6,14,15,16] which can easily be explained by the fact that male gender is prone to CAD.

Tobacco consumption is one of the most important risk factors of cardiovascular disease. Tobacco consumption is alarmingly high in young patients as shown by our study, which is as high as 68.9%. Many studies conducted across the globe in similar group of patients[7,9,17,18] have also found high rates of tobacco use among young CAD patients with percentage ranging from 70-90. Recent studies done in our centre by Tamrakar et al.[14] showed that 64.3% of the patients consumed tobacco. Another study done by Adhikari et al.[16] showed tobacco consumption in 70% of the patients. Smoking is known to cause increased fibrinogen concentrations and platelet aggregability, along with impaired fibrinolytic activity, decreased coronary flow reserve, and increased vasospasm.[19,20] Result of the Bogalusa Heart Study have showed that the extent of fatty-streak lesions in the coronary arteriesof young adults was higher in smokers than in nonsmokers.[21] The risk of CAD decreases after quitting smoking, and its benefit is correlated with amount smoked.[22] Moreover, smoking cessation can help prevent CAD,[23] especially in young people. All these evidence point out smoking as most important modifiable risk factor in young adults hence should be aggressively targeted. This highlights the need of effective preventive measures to stop increasing rate of smoking and tobacco consumption in younger generation.

Dyslipidemia, which is the second most common risk factor in our study, is very common in young Asian adults as shown by recent studies.[24,25,26] As demonstrated by Lipid Research Clinics Trail,[25,26] there is a direct association between the plasma lipoprotein profile, the cholesterol levels and the morbidity and mortality from coronary atherosclerosis. In our study, the incidence of other conventional risk factors such ashypertension (29.5%), diabetes (25.8%), and positive family history (6%) was less common as compared to older population. These findings were more or less similar to most

of the studies conducted in young CAD patients.[6,7,13,14,27]

More than half (54.5%) the patients presented as anterior wall MI including extensive anterior wall, followed by inferior wall. CAG with or without PCI were performed in 53.3% of patients with single vessel disease with LAD the culprit artery the most common findings seen in 32% of patients. These findings are inconcordance with most of the recent studies.[7,14,15]

In our study, the most common complication in young STEMI patients was arrhythmias (5.3%) followed by cardiogenic shock (4.5%) and heart failure,[3,6] which was similar to the study by Wong et al.,[12] in which the most common complication was arrhythmias (7.2%) followed by cardiogenic shock (4.5%). Most of the studies have showed in-hospital mortality of young MI patient was 1-6%, which correlates with the in-hospital mortality rate of our study (3%)[14,16,28] which was less as compared to overall mortality from STEMI (8.6%) from hospital registry. Most of the study results are similar or are in concordance with recent studies whereas few differ in some way or other, most likely reason might the study population as some studies are done in ACS patients, some are done in AMI and while others are done in STEMI patients. Although the younger STEMI patients generally are associated with a favorable prognosis, the personal and societal burden of premature CAD is substantial. Thus, effective preventative measures must be addressed by both patients and physicians in order to decrease long-term morbidity and mortality from coronary artery disease in young population and it should start early.

There are few limitations of our study which includes single center, retrospective study with small patient population. As it was a retrospective we could not include risk factors like obesity, inflammatory markers and others.

CONCLUSION

Acute STEMI in young was common in male. Tobacco consumption was a significant risk factor. Effective preventive with early diagnosis and treatment of risk factors is required to reduce the incidence of STEMI young population.

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