Original Article

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Clinical characteristics, risk factors and angiographic profile of acute coronary syndrome patients in a tertiary care center of Nepal.

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Abstract

Background and Aims: Acute coronary syndrome (ACS) refers to a group of clinical symptoms consistent with new onset or worsening ischemic symptoms. ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI) and unstable angina (UA) are the three types of ACS. The objectives were to study the risk factors prevalence, angiographic distribution and severity of coronary artery stenosis in ACS among patients admitted in Cardiology Department of Manmohan Cardiothoracic Vascular and Transplant Center (MCVTC).

Methods: This is a restrospective study of 419 ACS patients admitted and treated in MCVTC from November 2017 to October 2018. Patients were divided into STEMI, NSTEMI and UA then analyzed for various risk factors, angiographic patterns and severity of coronary artery disease.

Results: Mean age of presentation was 59.3±12.8 years. Majority were male 317(75.7%). Most patients had STEMI 252 (60.1%) followed by NSTEMI 98 (23.4%) and UA 69 (16.5 %). Risk factors: smoking was present in 241 (57.5%), hypertension in 212 (50.6%), diabetes in 144 (34.4%), dyslipidemia in 58 (13.8%). Single-vessel disease was present in 34.6 % patients, double- vessel disease was present in 27.44 % patients and triple vessel disease was present in 26.3 % patients, left main disease in 1.4 % patients. Normal coronaries were present in 6.4% patients and minor coronary artery disease in 3.8 % patients.

Conclusions: STEMI was the most common presentation. Three quarters of ACS were male patients. Smoking was most prevalent risk factor. Single vessel involvement was the most common CAG finding in all spectrum of ACS. Diabetic patients had more multivessel disease.

Keywords: Acute Coronary Syndrome, Angiogram, Nepal.

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Introduction

Ischemic heart disease (IHD) is the most common cause of mortality worldwide with over 7 million deaths annually.[1] It is estimated that 32 % of all death will be due to CAD and it will be the leading cause of disability[2] worldwide by 2020. The term acute coronary syndrome (ACS) refers to a group of clinical symptoms consistent with new onset or worsening ischemic symptoms and includes the spectrum of clinical conditions ranging from unstable angina (UA) to non—ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI). Unstable angina and NSTEMI are closely related conditions: their pathophysiologic origins and clinical presentations are similar, but they differ in severity.[3] The proportion of ACS types varies across various studies with decrease in the STEMI compared to NSTEMI owing to development of more sensitive markers of myocardial injury.[4] Each year in the United States alone, approximately 1.36 million hospitalizations are required for ACS (listed either as a primary or a secondary discharge diagnosis), of which 0.81

million are for myocardial infarction (MI) and the remainder are for UA. Roughly two-thirds of patients with MI have NSTEMI; the rest have STEMI[5]. While ACS has always been a significant health problem in the developed world, it has become more difficult for developing South Asian country like Nepal to cope with the rising burden of the disease. Meanwhile, we have limited data on the nature and distribution of ACS.[6-10]

The objectives of this retrospective study were to study the clinical profile, prevalence of risk factors and distribution of coronary artery stenosis in ACS patients admitted in Cardiology Department of MCVTC.

Methods

This is a retrospective study carried out in Manmohan Cardiothoracic Vascular and Transplant Center (MCVTC) from November 1, 2017 to October 31, 2018. After taking clearance from Institutional Review Board, 419 patients who presented to Cardiology Department of MCVTC in last one year with first episode of ACS undergoing coronary angiography were analyzed The clinical presentations of patient were categorized as NSTEMI and STEMI according to American College of Cardiology/American Heart Association (ACC/AHA) definitions and treated as per ACC/AHA recommendations.[11,12]

Inclusion Criteria:

1. All patients fulfilling diagnostic criteria for ACS.
2. Age ≥ 18 years.

Exclusion Criteria

1. Previous angina, angina equivalent or MI or coronary revascularization (more than two weeks old).
2. Patients with prior cardiac pathology like valvular heart disease, cardiomyopathy, pericardial disease or cor pulmonale.

Medical records were reviewed which included medical history, physical examination, age, gender, CAD risk factor profile, smoking history, lipid profile, fasting blood sugar, HbA1C levels, ECG, echocardiography and coronary angiography.

Dyslipidemia was defined as the presence of any of the following: patients on lipid lowering drugs or total cholesterol >240 mg/dl, triglycerides (TG) >150 mg/dl, low-density lipoprotein >130 mg/dl, and high-density lipoproteins (HDL) <50 mg/dl for female and <40 mg/dl for male.[13]

Diabetes Mellitus was defined as symptoms of diabetes, fasting blood sugar >126 mg/ dl (7.0 mmol/L) or HbA1C level > 6.5 or if patient was on oral hypoglycemic agents.[14]

Hypertension was defined as systolic blood pressure >140 and/or diastolic >90 mmHg and/or on anti-hypertensive treatment.[15]

Positive family history was considered if first degree relatives had CAD before the age of 55 years in men and 65 years in women.[13]

Significant CAD was defined as a diameter stenosis >50% in each major epicardial artery. Normal vessels were defined as the complete absence of any disease in the left main coronary artery (LMCA), left anterior descending (LAD), right coronary artery (RCA), and left circumflex (LCX) as well as in their main branches (diagonal, obtuse marginal, ramus intermedius, posterior descending artery, and posterolateral branch). Patients were classified as having single-vessel disease (SVD), double-vessel disease (DVD) or triple vessel disease (TVD) accordingly.

Statistical Analysis

The results were reported as mean and standard deviation for the quantitative variables and percentages for the categorical variables. The groups were compared using the Student's t-test for the continuous variables and the Chi-square test for the dichotomous variables. $P < 0.05$ were considered as statistically significant. All the statistical analyses were carried out via Statistical Package for Social Sciences version 20 (SPSS, IL, Chicago Inc., USA).

Results

Among 419 ACS patients, majority were male 317 (75.7%) and 192 (24.3%) were female (Fig 2). The mean age of presentation was 59.3+/- 12.8 years. Mean age of female and male patients was 61.75+ 10.85 and 58.5+ 13.35 years respectively. fifty six % of patients were above 60 years. fourteen % of patients were below 45 years (Fig 4). Most common presentation in ACS was STEMI with 252 (60.1%) patients followed by NSTEMI 98 (23.4%) and UA 69(16.5%) (Fig 3). Baseline characteristics are mentioned in Table I.

Table-I : Baseline characteristics of the study population (N = 419)

	Minimum	Maximum	Mean	Std. Deviation
Age	23.0	90.0	59.30	12.85
Fasting blood sugar (mg/dl)	56.0	299.0	123.00	40.59
HbA1C	4.3	12.4	6.27	1.56
Creatinine (mg/dl)	.45	7.0	.92	.41
Triglyceride	34.0	777.0	143.11	86.12
Total cholesterol	11.0	568.0	144.70	49.38
HDL	15.0	79.0	38.16	10.48
LDL	19.0	275.0	91.13	35.56
LVEF	20.0	70.0	49.66	11.24

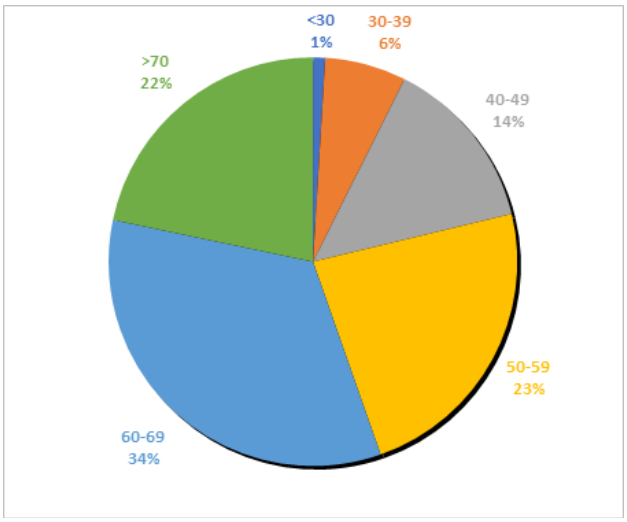

Fig.-1: Age distribution of study population

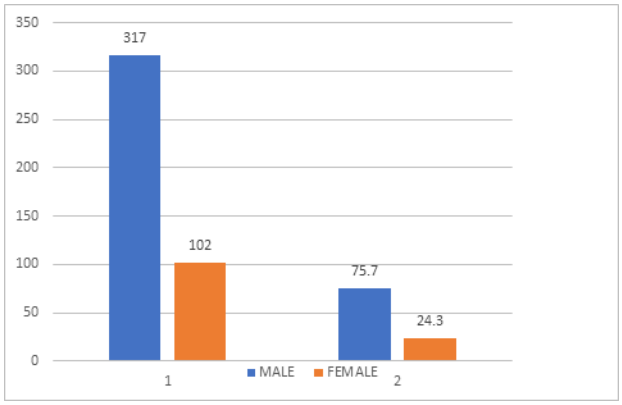

Fig.-2: Distribution of study population according to sex (N=419), 1 denotes total number of patients, 2 denotes percentage of patients.

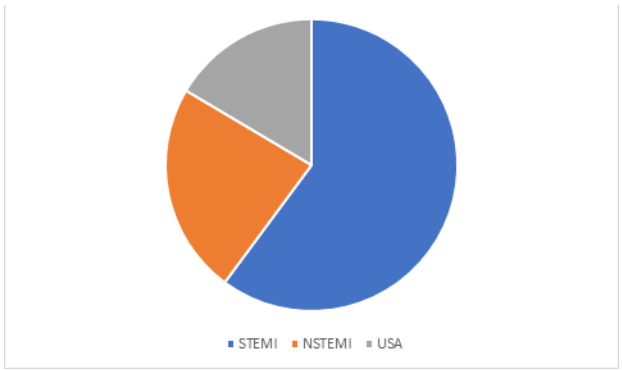

Fig.-3: Distribution of study population according to type of ACS

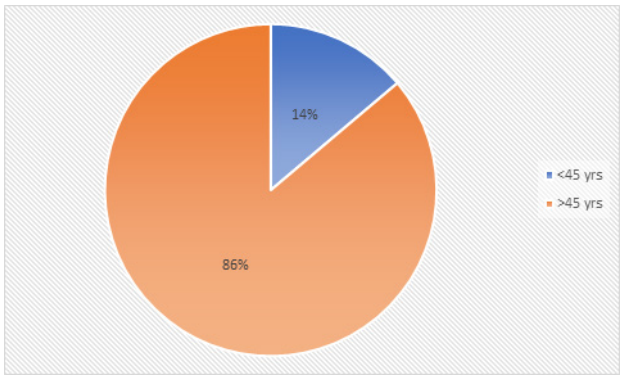

Fig.-4: Proportion of young ACS patients

Risk factors analysis

A total of 144 (34.4%) patients were diabetic and 212 (50.6%) patients were hypertensive. Smoking was the most prevalent risk factor found in 241 (57.5%) patients. Dyslipidemia was present in 58 (13.8%) patients. Family history of CAD was significant in 11 (2.6%) patients. Table II

Table-II : Distribution of study population according to clinical risk factors

Clinical Risk factor	Frequency	Percent (%)
Smoking	241	57.5
Diabetes Mellitus	144	34.4
Hypertension	212	50.6
Dyslipidemia	58	13.5
Family History	11	2.6

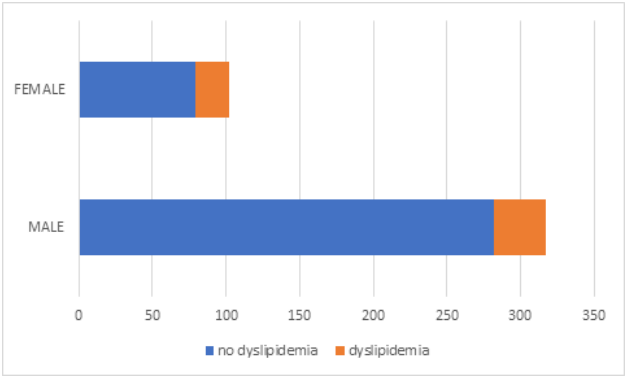

Fig.-5: Distribution of dyslipidemia according to sex

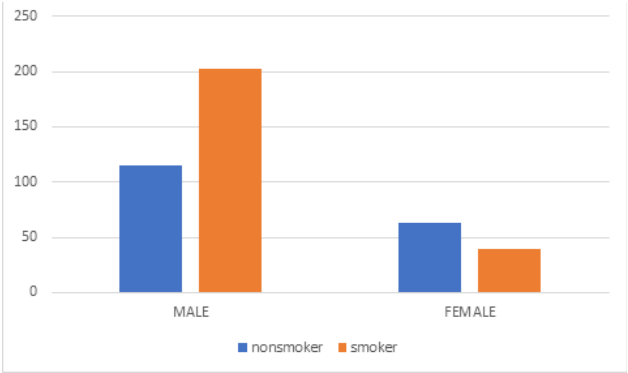

Fig.-6: Distribution of smoking according to sex

Dyslipidemia was seen significantly higher in female population 22.5 % compared to male 11 % (p=0.003) (Fig 5). Smoking was significantly higher in male population 63.7 % compared to female 38.2% (p=0.0001) (Fig 6). However, there was no gender difference in prevalence of Diabetes mellitus, hypertension and family history of coronary artery disease.

Angiographic profile

Overall, SVD was seen in 34.6 % patients, DVD in 27.44% patients, TVD in 26.3 % patients, left main disease in 1.4 % patients, normal coronary vessels in 6.4 % and nonsignificant lesion were seen in 3.8 % patients out of 419 patients (Fig 7). In STEMI, SVD was seen in 102 (40.4%), DVD in 76 (30.1%), TVD in 70 (27.8%), Left Main disease in 3 (1.2 %) and Minor lesion in 1 patient. In NSTEMI, SVD was seen in 23(23.4 %), DVD in 23 (23.4%), TVD in 34(34.7%), left main disease in 3(3 %), minor lesion in 9 (9.2 %) and normal coronaries in 8 (8.2 %). In UA, SVD was seen in 20(28.9%), DVD in 16 (23.2%), TVD in 6 (8.7 %) , Left Main disease in 2(2.9 %) , Minor Lesion in 6 (8.7 %) and Normal coronaries in 19 (28.36 %) (Fig 8). This showed greater incidence of insignificant lesions or normal coronaries in UA followed by NSTEMI.

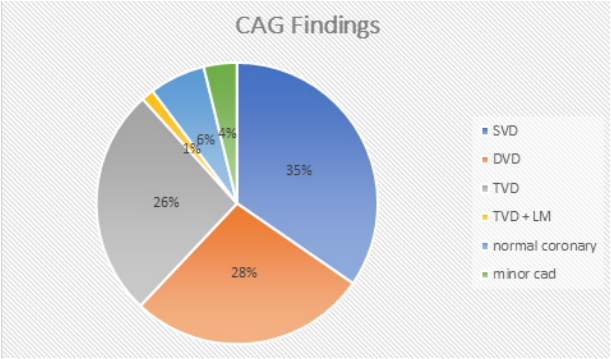

Fig.-7: Distribution of study population according to CAG findings.

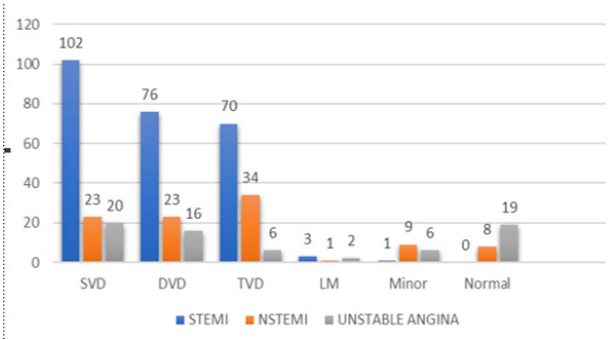

Fig.-8: Distribution of study population according to extent of disease

Of 317 male patients,199 (62.8%) were STEMI and 118 (37.2%) were NSTEMI and UA combined. Whereas in 102 female patients 53 (52 %) were STEMI and 49 (48%) NSTEMI and UA combined. This showed gender difference in the presentation of ACS (p =0.05) (Fig 9) However, there was no gender difference in the number of vessels involved (p=0.4%)

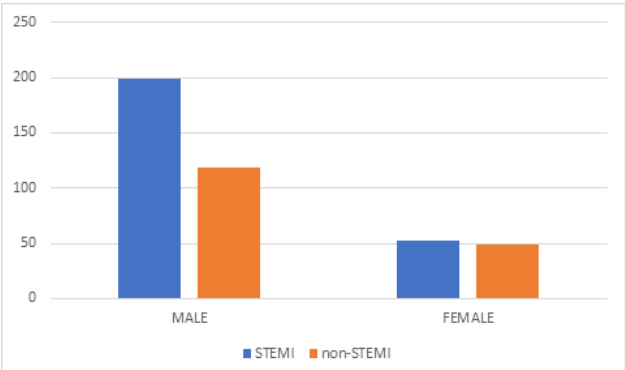

Fig.-9: Distribution of ACS according to sex

Of the risk factors, diabetic patients were more likely to have triple vessel disease compared to non-diabetics 52 (36.1%) vs 64 (23.2%) (p= 0.005) (Fig 10)

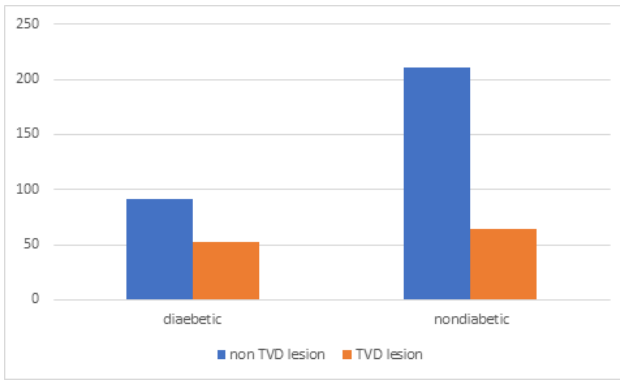

Fig.-10: Distribution of CAG findings in Diabetic population

In one case of STEMI there was completely normal CAG findings that was due to autothrombolysis.

Discussion

South Asia comprise around one quarter of world population and are at high risk of developing CAD.[16] As per Global Burden of Disease (GBD) 2010, CAD deaths have drastically increased in this region by 87% between 1990 to 2010 second only to East Asia.[18,19] This is predicted to increase a further 50% by 2030.[1] According to the latest WHO data published in 2017 Coronary Heart Disease deaths in Nepal reached 30,559 or 18.72% of total deaths. The age adjusted Death Rate is 158.35 per 100,000 of population which ranks Nepal as 41st in the world.[17]

This retrospective study was carried out at the department of Cardiology, MCVTC November 1, 2017 to October 31, 2018. The mean age of the study population was 59.3+12.8 years as compared to 60+12 years in a study by Mohanan et al[20], 58+11 years by Sahed et al in Pakistan[21], 51+8.80 years by Ahmed et al[22] in Bangladesh and 62+5 years in COURAGE trial[23] conducted in the USA. fifty six percent of patients were above 60 years and 14 % of patients were below 45 years and 21% were below 50 years compared to 27% in a study by Agrawal et al.[24]

Overall, women were older with female age of 61.75+10.85 years vs male age of 58.5+13.35 years compared to 66.41+13.1 years vs 52.49+11.7 years in a study by Singh et al[25] and 70.7+12.7 years vs 63.8+12.9 years in a study by Isorni et al.[26]

Among 419 patients, majority of the patients were male (75.7%) and only 24.7% were female. This is as seen in INTERHEART study[27] and its South Asian Cohort (Overall Male 76% and 85% in South Asian Male)

Smoking is an established risk factor for Coronary Artery Disease. In our study, smoking was the most prevalent risk factor found in 241 (57.5%) patients. Smoking was significantly higher in male population 63.7% compared to female 38.2% (p=0.0001). This is similar to study done in Pakistan[28] where 52% were smoker and male were more likely to be smoker compared to female.

Followed by smoking, hypertension was the most common risk factor with 212(50.6%) patients being hypertensive. The prevalence of hypertension in the South Asian Cohert of INTERHEART Study[27] was 31.1 % which is much lower than our study. However, studies done in India[29] and Pakistan[28] showed 48 % and 55 % respectively which is similar to our study.

Diabetes is another important risk factor which was found in 34.4% of study population. This was again higher than shown by INTERHEART study[27] in South Asian Cohort but similar to South Asian Studies. Study in Bangladesh[22] showed 29% of ACS patients were diabetics. Similarly, another study in North India[29] showed 40 % prevalence of Diabetes in ACS patients.

Of the risk factors, diabetic patients were more likely to have triple vessel disease compared to non-diabetics (36.1 % vs 23.27) (p= 0.005). Similar result was seen in a study by Gui et al[30] in China and Kumar et al[29] in India. This relatively higher prevalence of Triple Vessel Disease in diabetic population compared to non-diabetics proves diabetes is an important chronic risk factor for CAD.

Dyslipidemia is another important risk factor which was present in 58 (13.8%) patients. Dyslipidemia was seen significantly higher in female population (22.5 % compared to male 11 % (p=0.003)) similar to that found in a study done in Bangladesh[31].

Around 60% of our ACS patients were STEMI followed by NSTEMI (23.4%) and UA (16.5%). This finding is similar to that seen in Indian studies[32] where STEMI is predominant. This is different to European studies where NSTEMI predominates.[33-35] STEMI was the most common presentation in both sexes. However, NSTEMI and UA were more common in female than in male counterpart with statistical significance (p =0.05). This was similar to another study by Isorni et al.[26]

Angiographic profile

Single-vessel involvement was the most common in all groups of ACS (34.6%) including UA, NSTEMI and STEMI, followed by double-vessel (27.44%) and triple vessel disease (26.3%) and left main disease in 1.4 % patients. Akanda et al[36] also showed more single vessel involvement. Similarly, Kumar et al[29] and Tewari et[37] al also similar finding

Angiographically, absolutely normal vessels were present in 6.4% and minor coronary artery disease was seen in 3.8 % patients which was more prevalent in UA followed by NSTEMI. Angiographically normal coronary was seen in 14 % cases of ACS in a study by Ahmed et al[22]. In UA, many patients may have been over diagnosed and so were false positive. Similarly, false positive cases in NSTEMI may be attributed to other causes of raised troponin levels apart from myocardial infarction like myocarditis, infection with sepsis and renal impairment.[38]

Study Limitations

Our study was a single center, retrospective and observational analysis. This can be associated with selection bias and missing information. No follow up data was presented as this study was based only on in-hospital records.

Conclusion

CAD is a major health challenge for us. Despite decrease in cardiovascular disease mortality in developed countries, substantial increases have been experienced in developing countries like ours. In our study population, there was male preponderance. STEMI was the most common presentation of ACS which is different from the European study where NSTEMI is common. Smoking is the most common risk factor followed by hypertension and diabetes mellitus. Single vessel disease was the most common CAG finding irrespective of type of ACS. Diabetic patients had more multivessel CAD compared to non-diabetics. Nation-wide research should be done to determine the different aspects of CAD in Nepal so as to estimate the magnitude of problem it bears on overall health of the people. Primary and secondary prevention strategies should be vigorously pursued.

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