



## Original Article

# Outcome of Acute Coronary Syndrome and Its Association with Major Risk Factors among Patients Admitted in Coronary Care Unit of Sylhet Women's Medical College Hospital

Khandker Md Akhtaruzzaman<sup>1</sup>, Debashish Paul<sup>2</sup>, Md Hafiz Ehsanul Hoque<sup>3</sup>

<sup>1</sup>Professor, Department of Cardiology, Sylhet Women's Medical College, Sylhet.

<sup>2</sup>Associate Professor, Department of Cardiology, Sylhet Women's Medical College, Sylhet.

<sup>3</sup>Lecturer, Department of Community Medicine, Sylhet MAG Osmani Medical College, Sylhet.

### ABSTRACT

Cardiovascular disease is one of the leading causes of morbidity and mortality in the world. Among the cardiovascular diseases acute coronary syndrome (ACS) remains a major cause of mortality and morbidity. Outcome of ACS patients and their relation with the risk factors in a low resource setting is important for decision making and thus appropriate intervention. This cross sectional study was conducted among ACS patients admitted in coronary care unit (CCU) of Sylhet Women's Medical College Hospital from June 2016 to April 2017 to find out the outcomes of ACS patients and their associated risk factors. Document review was used for collection of data. A total of 322 ACS patients were included in this study. The result showed that, the mean age of the patient was  $57.7 \pm 13.9$  years with male (68%) preponderance. One third (32.12%) of the patients suffered from ST elevation myocardial infarction (STEMI) and 41.6% suffered from non ST elevation myocardial infarction (NSTEMI). Two third (66.8%) of the patients had any type of risk factors like hypertension (HTN), diabetes mellitus (DM), smoking and one third did not have any risk factor prior to admission to the hospital. Two fifth (41.7%) of the patients had HTN and one third (31.4%) of the patients had DM. Two third (66.5%) of the patients developed any type of complications; about 40% had heart failure and 21.7% had cardiogenic shock. About 7% of the patients died in the hospital. So complications of ACS like heart failure and cardiogenic shock was high in this setting.

**Keywords:** ACS, STEMI, NSTEMI, UA, HTN, DM, Risk factors for CAD.

[Jalalabad Med J 2019; 16(1): 23-28]

### INTRODUCTION

Cardiovascular disease is one of the leading causes of morbidity and mortality in the world<sup>1</sup>. Acute Coronary Syndrome (ACS), the acute manifestation of ischemic heart disease, remains the major cause of mortality and morbidity worldwide<sup>2</sup>. It is responsible for about 30 percent of all global deaths<sup>3</sup>. By 2020, it is predicted

that coronary artery disease (CAD) will claim 25 million lives annually and that CAD will surpass infectious disease as the world's number one cause of death and disability<sup>3</sup>.

ACS describes the range of myocardial ischemic states that includes unstable angina (UA), non-ST elevation myocardial infarction (NSTEMI) or ST elevation myocardial infarction (STEMI). The diagnosis and classification of ACS is based on a thorough review of clinical features including electrocardiogram (ECG) findings and biochemical markers of myocardial necrosis. UA is defined by the presence of ischemic

### Address of Correspondence:

Prof. Khandker Md. Akhteruzzaman, Professor, Department of Cardiology, Sylhet Women's Medical College, Sylhet, Mobile: +8801711349734, E-mail: drakhtar1960@yahoo.com

symptoms without elevations of biomarkers and transient ECG changes, if any. The term myocardial infarction (MI) is used when there is evidence of myocardial necrosis in the setting of acute myocardial ischemia. STEMI is differentiated from NSTEMI by the presence of persistent ECG findings of ST segment elevation. In recent years, progress has been made in the management of ACS, particularly related to optimizing pharmacotherapy<sup>2</sup>. Estimates from the global burden of disease study suggest that by the year 2020, South Asian countries will have more individuals with atherosclerotic cardiovascular diseases than any other region<sup>4</sup>. Deaths related to cardiovascular disease also occur 5 to 10 years earlier in South Asian countries than they do in Western countries<sup>5</sup>. Factors such as age, family history, abnormal blood lipid profile, hypertension, diabetes mellitus and smoking have been shown to be effective on coronary artery disease incidence<sup>6</sup>. Evidence suggests higher age, male sex and having family history increases the risk of atherosclerosis and thus ACS. Hypertension and diabetes mellitus are also increase the risk of cardiovascular events. There is a strong, dose-linked relationship between cigarette smoking and CAD. Physical inactivity and obesity are independent risk factors for atherosclerosis; regular exercise appears to have protective effect. Nearly all patients with acute MI have some form of arrhythmia. Pain relief, rest and the correction of hypokalaemia are important preventive measures. Ventricular fibrillation (VF) occurs in 5-10% of patients who reach hospital<sup>7</sup>.

As south Asians are more at risk of having cardiovascular disease related mortality and morbidity there is need for extensive research to find out the outcome of the ACS patients and factors associated with this group of population and way to intervene. This study aimed to find out the outcomes of ACS patients admitted in a tertiary level private medical college hospital and their associated risk factors that can help to develop appropriate intervention.

## MATERIALS AND METHODS

This was a cross sectional study conducted among the diagnosed cases of ACS patients admitted in the CCU of Sylhet Women's Medical College Hospital, Sylhet from the period of June 2016 to April 2017. Selected variable were collected from the hospital records of the patients admitted in Coronary Care Unit (CCU) by document review. During that period 1827 patients were admitted in cardiology department. Among them 322 patients were diagnosed as ACS on the basis of

history, ECG findings and biochemical test (Troponin I). Patients who were admitted with typical chest pain, ECG changes and positive troponin I were included in the study. Regarding outcome of the patients, stable patients after getting treatment was considered as good outcome and they were discharged to home. Other patients who died or were referred to higher facilities were considered as worse outcome. Statistical package for social sciences version 17 was used for data analysis. Continuous variables are presented by mean with SD and categorical variables are presented as frequencies and percentages. Chi square test was used to compare among the outcome of the patients with categorical variables and t test was used to compare among the means of continuous variables with outcome of ACS.

## RESULTS

Table-I showed the demographic characteristics of the patients. Among the 322 patients, more than two third (68%) of the patients were male. The mean age of the patients was  $57.65 \pm 13.9$  years. Age distribution of the patients showed elderly patients suffered from ACS compared to younger adults. Peak age of admission was found to be around sixties. About three fourth (72.2%) of the patients were of the age group of 40 to 69 years. Among the patients two third (66.5%) were from rural areas whereas one third from urban areas. Table-II demonstrated that, one third (32.12%) of the patients suffered from STEMI, two fifth (41.61%) of the patients suffered from NSTEMI and more than about a quarter (28.26%) of the patients suffered from UA. In terms of outcome of ACS patients admitted in the hospital, more than two third (70.8%) of the patient became stable and discharged to home and rest of the patients (29.2%) did not improved and they either died in the hospital (7.1%) or were referred to higher center (22.1%). Table-III demonstrated the distribution of the patients in terms of socio-demographic variables and types of outcome. Mean age of the patients who were stable and discharged to home after treatment was higher than the patients who were referred or died but the difference was not statistically significant. Outcome of the ACS patients and gender distribution showed males were more to suffer from death or referred (male 31.5%, female 24.3%) but the difference was not statistically significant. In terms of residence, more rural people were admitted (66.5%) in the CCU than urban people. Residence of the patient was not significantly related with the outcome of ACS. Table-IV showed the distribution of the patients according to

**Table-I:** Socio-demographic characteristics of the patients (n=322).

Variables	Frequency	Percentage
<b>Sex</b>		
Male	219	68
Female	103	32
<b>Age (In years)</b>		
<30	4	1.2
30-39	27	8.4
40-49	52	16.1
50-59	79	24.5
60-69	97	30.1
70-79	38	11.8
≥80	25	7.8
<b>Residence</b>		
Rural	214	66.5
Urban	108	33.5

**Table-II:** Distribution of patients according to types of ACS and outcome (n=322).

Type of ACS N (%)	Stable and Discharged N (%)	Unstable and Referred N (%)	Death N (%)
Total 322 (100)	228 (70.8)	71 (22.1)	23 (7.1)
STEMI 97 (30.12)	58 (59.8)	29 (29.9)	10 (10.3)
NSTEMI 134 (41.61)	94 (70.1)	27 (20.1)	13 (9.7)
UA 91 (28.27)	76 (83.5)	15 (16.5)	0 (0)

the outcomes of ACS and presence of different risk factors. Table-IV also showed two third of the patients (66.8%) had any type of risk factors and one third did not. It revealed that, presence of risk factors did not affect the outcome of the patients significantly. Individual risk factors also were not differed statistically among the outcome of the patients. Table-V

revealed that, duration of hospital stay in CCU between the outcomes of the ACS patients was not different statistically. Presence of complications were significantly related with the outcome of the ACS patients as it revealed patients having complication were more to experience referral or death. Among the patients, two third (66.5%) suffered from

**Table-III:** Socio-demographic variables and outcome of ACS (n=322).

Variable	Category	Stable	Referred and Death	$\chi^2$ or t test	p-value
Sex	Male 219 (68%)	150 (65.8%)	69 (73.4%)	1.77	0.18
	Female 103 (32%)	78 (34.2%)	25 (26.6%)		
Age	< 60 years 162 (50.3%)	111 (48.7%)	51 (54.3%)	0.83	0.36
	>60 years 160 (49.7%)	117 (51.3%)	43 (45.7%)		
Mean Age		58.05±14.29	56.68±12.87	0.36	0.42
Residence	Rural 214 (66.5%)	155 (68%)	59 (62.8%)	0.81	0.37
	Urban 108 (33.5%)	73 (32%)	35 (37.2%)		

complications. About two fifth of the patients had heart failure (39.4%), one fifth of the patients had shock (21.7%) and 15.8 percent had persistent or recurrent angina. Patient who were referred or died, most of them suffered from heart failure (50%) and shock (45.7%). About 8% of the patients suffered from drug related complications and most of them suffered from haemorrhage. Outcome of the patients did not differ significantly with the complication of drugs.

## DISCUSSION

This study primarily focused on the outcome of the

ACS patients admitted in a tertiary care private hospital. ACS patients were treated here only by conservative approach due to unavailability of interventional management. This study revealed that, males were more to suffer from ACS which was similar to other studies. The male female ratio in our study was 2:1 which was similar to the study conducted in Iran and Spain<sup>8,9</sup>. It was also near to the study conducted in Switzerland<sup>10</sup> but the finding was lower than the study conducted in Taiwan<sup>11</sup>, in Lebanon<sup>12</sup> and in KSA<sup>13</sup>. Mean age of the patients in our study was 57.7±13.9 years which was near to multicenter study conducted in

**Table-IV:** Presence of risk factors and outcome of ACS (n=322).

Variable	Category	Stable	Referred and Death	$\chi^2$	p-value
Presence of any risk factor	Present 215 (66.8%)	151 (66.2%)	64 (68.1%)	0.10	0.75
	Absent 107 (33.2%)	77 (33.8%)	30 (31.9%)		
HTN	Present 160 (49.7%)	114 (50%)	46 (48.9%)	0.03	0.86
	Absent 162 (50.3%)	114 (50%)	48 (51.1%)		
DM	Present 101 (31.4%)	71 (31.1%)	30 (31.9%)	0.02	0.89
	Absent 221 (68.6%)	157 (68.9%)	64 (68.1%)		
Dyslipidemia	Present 33 (10.2%)	27 (11.8%)	6 (6.4%)	2.16	0.14
	Absent 289 (89.8%)	201 (88.2%)	88 (93.6%)		
Smoking status	Smoker 37 (11.5%)	28 (12.3%)	9 (9.6%)	0.48	0.49
	Non smoker 285 (88.5%)	200 (87.7%)	85 (90.4%)		

**Table-V:** Distribution of the patients in terms of complications and outcome of ACS (n=322).

Variable	Category	Stable	Referred and Death	$\chi^2$ or t test	p-value
Hospital stay (In days)		2.7±1.8	2.2±1.4	0.34	0.73
Management	Enoxaparine 160 (49.7%)	177 (77.6%)	83 (88.3%)	4.87	0.03
	Streptokinase 88 (27.3%)	53 (23.2%)	35 (37.2%)	6.56	0.01
Complications	Present 214 (66.5%)	130 (57%)	89 (89.4%)	31.24	0.00
	Absent 108 (33.5%)	98 (43%)	10 (10.6%)		
Complications of drugs	Present 26 (8.1%)	15 (6.6%)	11 (11.7%)	2.34	0.13
	Absent 296 (91.9%)	213 (93.4%)	83 (88.3%)		
Types of complication	Heart failure 127 (39.4%)	80 (35.1%)	47 (50%)	44.97	0.00
	Shock 70 (21.7%)	27 (11.8%)	43 (45.7%)		
	Recurrent or persistent angina 51 (15.8%)	32 (14%)	19 (20.2%)		
	Arrhythmia 14 (4.3%)	7 (3.1%)	7 (7.4%)		



India (57.5 years)<sup>14</sup> and a study conducted in KSA (58 years)<sup>13</sup> but lower than the study conducted in Iran (60.1 years)<sup>8</sup>, Taiwan (63.1)<sup>11</sup>, Lebanon (64.1)<sup>12</sup> and Switzerland (66.1)<sup>10</sup>. This finding was also in line with the finding that suggests cardiac disease affects South Asian in earlier ages compare to the developed world. Study revealed one third (32.12%) of the ACS patients suffered from STEMI which was higher than the study conducted in Iran (26%)<sup>8</sup> and American University Medical Center of Beirut (22%)<sup>12</sup>. Our study finding was lower than the study conducted in India (60.6%)<sup>14</sup>, Taiwan (52%)<sup>11</sup> and Switzerland (56.7%)<sup>10</sup>.

In this study we found two third of the ACS patients had any conventional risk factors like DM, HTN, dyslipidemia or smoking habit. About half (49.7%) of the patient had hypertension in this study which was similar to the findings of the study conducted in KSA (55.3%)<sup>13</sup>, Iran (49.9%)<sup>8</sup>, Lebanon (55.5%)<sup>12</sup> and Swiss study (56.8%)<sup>10</sup> but higher than the study conducted in India, where 37.7 percent of the patients had hypertension<sup>14</sup>. Prevalence of HTN was much higher among the patients of the study conducted in Spain (67.5%)<sup>9</sup>. Prevalence of DM in this study was 31.4 percent which was similar to the studies conducted in India (30.4%)<sup>14</sup>, Lebanon (31.5%)<sup>12</sup> and Iran (31.1%)<sup>8</sup>. Prevalence of DM was lower in the Swiss study (20%)<sup>10</sup> and higher in the studies conducted in Spain (38%)<sup>9</sup> and Taiwan (36%)<sup>11</sup>. Only one tenth of the patients in this study had dyslipidemia whereas other studies found much higher percentage of patients had dyslipidemia (39.1% to 59.7%)<sup>9,10,13</sup>. Meta-analysis of the articles published in the journals reported the prevalence of the risk factors among people of Bangladesh like type 2 DM, HTN, dyslipidemia and smoking were 5.9%, 15.1%, 34.35% and 40.56% respectively<sup>15</sup>. Reason of low prevalence of dyslipidemia in our study could not be identified and need to be explored. The study also demonstrated that one third of the patient who suffered from ACS did not have any risk factors. Further study is required to explore other risk factors attributed to ACS in this group of population.

Two third of the patients had any type of complications. About two fifth of the patients had heart failure (39.4%) and more than one fifth (21.7%) had experienced shock. The finding was very much higher than the findings of the other studies, like Abdallah et al. who demonstrated 6.8% of cardiac failure and 1.2% of cardiogenic shock among the patients attending American University Medical Center, Beirut<sup>12</sup>. KSA study found 10.2 % of the patient had heart failure and

4.3% of the patient had shock<sup>13</sup>. In Switzerland study only 2.7% of the people had heart failure and 5.5% had cardiogenic shock<sup>10</sup>. Such a high level of complications of the patients should be explored meticulously to identify the ways to intervene may be due to late presentation in CCU. Mortality among the ACS patients in our study was 7.1% which was similar to the studies conducted in India (6.6%)<sup>14</sup> and Switzerland (6.3%)<sup>10</sup> but higher than the findings of Beirut (3.9%), KSA (3%), Iran (4.3%) and Taiwan study (1.8%). The higher mortality of the ACS patients in our study was possibly contributed due to lack of interventional facilities to provide superior care to the cardiac patients. Outcome of the ACS patients in the hospital in our study did not statistically vary by sociodemographic characteristics like age, sex and residence. Outcome of the patients also did not affect by the presence of any risk factor among the patients as it revealed presence of common risk factors like HTN, DM, smoking did not influence the outcome of the patients. The only factor that significantly influenced the outcome of the patient of ACS in our study was development of complications like heart failure and shock.

This study had some limitations. This study conducted in a single hospital that might not represent all ACS patients. As we reviewed the admitted patients' documents, there was lack of information on the documents like, BMI, physical exercise habit, duration of smoking, duration of HTN and duration of DM among the patients etc. The outcome of the referred patients was not documented. For this reason, we included the referred patients and mortality as worse outcome.

## CONCLUSION

The study concluded that, complications like heart failure and cardiogenic shock were very high among the ACS patients in our setting as well as mortality of the patients. Reasons of higher rates of heart failure and cardiogenic shock among the ACS patients should be explored.

## REFERENCES

1. Hsu PC, Su HM, Juo SH, Yen HW, Voon WC, Lai WT, et al. Influence of high-density lipoprotein cholesterol on coronary collateral formation in a population with significant coronary artery disease. *BMC Res Notes* 2013; 6(1): 105.

2. Eisen A, Giugliano RP, Braunwald E. Updates on Acute Coronary Syndrome: A Review. *JAMA Cardiol* 2016; 1(6): 718-30.
3. Gaziano TA, Gaziano JM. Global burden of cardiovascular disease. In: Bonow RO, Mann DL, Zipes DP, Libby P, editors. *Braunwald's heart disease: a text book of cardiovascular medicine*. 9th ed. Missouri: Elsevier, Saunders; 2011. p. 1-20.
4. Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases: Part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. *Circulation* 2001; 104(22): 2746-53.
5. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *JAMA* 2007; 297(3): 286-94.
6. Truelsen T, Mähönen M, Tolonen H, Asplund K, Bonita R, Vanuzzo D, et al. Trends in stroke and coronary heart disease in the WHO MONICA Project. *Stroke*. 2003; 34(6): 1346-52.
7. Innes JA, Maxwell S, *Cardiovascular Diseases, Davidson's Essentials of Medicine*, 2nd ed, New Delhi, Elsevier 2016, P-201-263.
8. Kassaian SE, Masoudkabar F, Sezavar H, Mohammadi M, Pourmoghaddas A, Kojouri J, et al. Clinical characteristics, management and 1-year outcomes of patients with acute coronary syndrome in Iran: the Iranian Project for Assessment of Coronary Events 2 (IPACE2). *BMJ Open* 2015; 5(12): e007786.
9. Orenes-Piñero E, Ruiz-Nodar JM, Esteve-Pastor MA, Quintana-Giner M, Rivera-Caravaca JM, Veliz A, et al. Therapeutic management and one-year outcomes in elderly patients with acute coronary syndrome. *Oncotarget* 2017; 8(46): 80182-91.
10. Erne P, Radovanovic D, Seifert B, Bertel O, Urban P, AMIS Plus Investigators. Outcome of patients admitted with acute coronary syndrome on palliative treatment: insights from the nationwide AMIS Plus Registry 1997-2014. *BMJ Open* 2015; 5(3): e006218.
11. Shyu KG, Wu CJ, Mar GY, Hou CJY, Li AH, Wen MS, et al. Clinical Characteristics, Management and In-Hospital Outcomes of Patients with Acute Coronary Syndrome - Observations from the Taiwan ACS Full Spectrum Registry. *Acta Cardiol Sin* 2011; 27(2): 135-44.
12. Abdallah M, Karrowani W, Shamseddeen W, Itani S, Kobeissi L, Ghazzal Z, et al. Acute Coronary Syndrome: Clinical Characteristics, Management, and Outcomes at the American University of Beirut Medical Center, 2002-2005. *Clin Cardiol* 2010; 33(1): E6-E13.
13. Al Habib KF, Hersi A, Al Faleh H, Al Nemer K, Al Saif S, Taraben A, et al. Baseline characteristics, management practices, and in-hospital outcomes of patients with acute coronary syndromes: Results of the Saudi project for assessment of coronary events (SPACE) registry. *J Saudi Heart Assoc* 2011; 23(4): 233-9.
14. Xavier D, Pais P, Devereaux PJ, Xie C, Prabhakaran D, Reddy KS, et al. Treatment and outcomes of acute coronary syndrome in India (CREATE): a prospective analysis of registry data. *Lancet* 2008; 371(9622): 1435-42.
15. Fatema K, Zwar NA, Milton AH, Ali L, Rahman B. Prevalence of Risk Factors for Cardiovascular Diseases in Bangladesh: A Systematic Review and Meta-Analysis. *PLoS One* 2016; 11(8): e0160180.