

Pattern of Acute coronary syndrome (ACS) at the Emergency Department of tertiary referral hospital, Addis Ababa, Ethiopia

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ABSTRACT

Background: Acute coronary syndrome (ACS) is the leading cause of death and disability-adjusted life years globally, with low- and middle-income countries (LMIC) bearing a high proportion of the burden. In this study, we aimed to assess the pattern of ACS at St Paul's hospital Emergency department.

Methods: A cross-sectional study was carried out from September 1, 2017, to October 31, 2019, at St Paul's Hospital Millennium Medical College. Patients aged > 18 years old who presented to the Emergency Department and had a diagnosis of Acute Coronary Syndrome were included. A structured checklist was used to collect data from patient charts. Data was analyzed using SPSS version 25.

Results: 103 patients were enrolled during the study period. The majority were males ($n = 69$, 64.5%). The average age was 55.65 ± 13.96 years. The majority of patients ($n = 67$, 65.1%) arrived at the emergency department by taxi and 60 patients (58.3%) were referred. The most common chief complaints were chest pain ($n = 79$, 76.7%), easy fatigability ($n = 58$, 56.3%), and epigastric discomfort ($n = 44$, 42.7%). The mean duration of symptoms before presentation to the ED was 3.4 ± 2.83 days. The most common risk factors identified were hypertension ($n = 47$, 45.6%) and diabetes mellitus ($n = 31$, 30.1%). Types of ACS included ST-elevation myocardial infarction (STEMI) ($n = 74$, 71.8%), non-ST-elevation myocardial infarction (NSTEMI) ($n = 22$, 21.4%) and unstable angina ($n = 7$, 6.8%). Heart failure was the most common complication at presentation. The most common echocardiography findings were wall motion abnormalities (85.4%) and decreased ejection fraction (60.2%). The ED mortality rate was 6.8%.

Conclusion: The majority of patients with ACS used taxi and arrived at the hospital late. The most common presentations were chest pain and easy fatigability. STEMI was the most common type of ACS identified.

Citation: Rakeb Mulugeta Feyissa, Ayalew Zewdie Tadesse. Pattern of Acute coronary syndrome (ACS) at the Emergency Department of tertiary hospital, Addis Ababa, Ethiopia. PAJEC.2023;1(1):7-15.

Key words: Acute coronary syndrome, Emergency department, resource-limited setting,

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Received: November 7, 2022

Accepted: January 18, 2023

Published: February 9, 2023

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1. Introduction

Acute coronary syndrome (ACS) is a spectrum of diseases comprising unstable angina (UA), non-ST segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI). ACS is the leading cause of death and disability-adjusted life years globally, with low- and middle-income countries (LMIC) bearing a high proportion of the global disease burden. [1, 2]

In a study done in tertiary teaching hospitals of sub-Saharan Africa, out of 2156 medical patients who were admitted to the high dependency and intensive care units over 25 months, 111(5.1%) of them were found to have ACS, of which the inpatient mortality was 8.1%. [3]

There aren't many studies in our country to assess the burden of ACS from hospitals' emergency department. The prevalence of cardiovascular emergency in the Emergency Room (ER) of Addis Ababa University specialized hospital was 11% of the medical emergency admission; of this, ischemic heart disease was the third principal cause of cardiovascular emergency admissions. [4]

In this study, we aimed to study the clinical presentation, risk factors, and management of patients with ACS at St Paul's Hospital Millennium Medical College (SPHMMC).

2. Methodology

We conducted a cross-sectional study in the St Paul's Hospital Millennium Medical College (SPHMMC) in patients who were diagnosed with ACS during the study period from October 1, 2017, to September 31, 2019.

St. Paul millennium medical college is one of the largest referral hospitals in Ethiopia, with an average of 1200 emergency and outpatient clients daily. The college's Cardiac center is

located in Saint Peter hospital; it was established in 2016 with a capacity of 16 beds, of which 4 beds are for Cathlab. The cardiac center sees an average of 35 to 40 patients per day. All patients with a final diagnosis of ACS at SPHMMC during the study period were included.

Data was collected from a retrospective review of patient charts using structured and pretested questionnaires by trained data collectors. Data was entered, cleaned, and analyzed using SPSS version 25. We used descriptive statistics to describe demographics, risk factors, clinical features, types of acute coronary syndrome, management, and disposition of patients with ACS. Frequency, percentage, and median with interquartile range were used for reporting descriptive statistics. Results were shown using tables.

The Institutional Review Boards of St Paul's Hospital Millennium Medical College approved the study. No personal identifiers were used in the data collection questionnaire, and codes were used in place of them.

3. Results

3.1 Demographics

A total of 103 ACS patients were seen during the study period, with an average age of 56 ± 14 years. The majority were males, 69 (64.5%), with a M: F ratio of 2.03:1.

Patients who came by taxi were sixty-seven (65.1%), while 16 (15.5%) patients used an ambulance to arrive at the hospital's emergency department

The median time of presentation after the onset of symptom was 2 days with interquartile range of 18 hours to 5 days.

3.2 Clinical presentation and risk factors

Seventy-nine (76.7%) patients presented with chest pain followed by easy fatigability 58 (56.3%)

and epigastric discomfort 44 (42.7%). Of those patients who had chest pain, 63 (79.8%) had radiating chest pain commonly to the arms 33(52.4%), followed by the shoulder 25 (39.7%).

Forty-five (57%) patients described their chest pain as squeezing and 62(78.5%) severe in quality. (Table 1)

Table 1: Characteristics symptoms of patients presenting to SPHMMC ED, Addis Ababa, Ethiopia, October 2017 to September 2019.

Variables	Frequency	Percentage
Symptoms at presentation		
Chest Pain	79	76.7%
Chest pain with radiation	63	79.7%
Chest pain without radiation	16	20.3%
Easy fatigability	58	56.3%
Epigastric discomfort	44	42.7%
Diaphoresis	35	34%
Shortness of breath	35	34%
Nausea/vomiting	32	31.1%
Loss of consciousness	9	8.7%
Palpitation	6	5.8%
Paroxysmal Nocturnal Dyspnea	5	4.9%
Orthopnea	4	3.9%
Generalized body swelling	2	1.9%
Radiation of chest pain		
Arm	33	52.3%
Left arm	23	36.5%
Right arm	5	7.9%
Both arms	5	7.9%
Shoulder	25	39.7%
Left shoulder	18	28.6%
Right Shoulder	1	1.6%
Both shoulders	6	9.5%
Back	11	17.5%
Neck	7	11.1%
Jaw	55	7.9
Epigastric area	2	3.2%
Types of chest pain		
Squeezing	45	57%
Heaviness	18	22.8%
Stabbing	12	15.2%
Dull aching	4	5.1%
Severity of Chest pain		
Moderate	17	21.5%
Severe	62	78.5%

From the risk factors identified, 47 (45.6%) patients had hypertension, while 31 (30.1%) had diabetes mellitus. (Table 2)

Table 2: Risk factors identified for patients with ACS at SPHMMC ED, Addis Ababa, Ethiopia, October 2017 to September 2019.

Risk factors identified	Frequency(percentage)
Diabetes Mellitus	31(30.9%)
Hypertension	47(45.6%)
Dyslipidemia	7(7.1%)
Obesity	4(4.5%)
HIV	3(2.9%)
Smoking history	14(13.6%)
Previous MI	6(5.8%)

3.3 Diagnostics

Seventy-four (71.8%) patients had ST elevation in initial ECG, accounting for 74(71.8%), 18(17.5%) ST depression and T wave inversion, and 11(10.7 %) had unremarkable ECG. Echocardiography showed wall motion abnormality seen in 88 (85.4%), followed by decreased ejection fraction in 62(60.2%)

patients, 7(6.8%) regurgitation, 4 (3.9%) LV thrombus

Seventy-four (71.8%) had STEMI, 22(21.4%) had NSTEMI, and 7(6.8%) had unstable angina. Of seventy-four (71.8%) patients who had STEMI, 30(40.5%) patients were in Killip class III, and IV. (Table 3)

Table 3: Diagnosis of ACS in patients presented to SPHMMC/AaBET hospital ED, Addis Ababa, Ethiopia from October 2017 to September 2019.

Diagnosis of ACS	Frequency	Percentage
1) STEMI	74	71.80%
Killip class I	35	47.3%
Killip class II	9	12.20%
Killip classIII	22	29.70%
Killip class IV	8	10.80%
2) NSTEMI	22	21.40%
3) Unstable angina	7	6.80%

3.4 Complications detected in ED

Of the 103 patients who presented to the ED, 39 (37.9%) had at least one complication. Heart failure was present in 21(20.4%); it was the commonest complication, followed by dysrhythmia in 17(16.5 %) patients with ACS. The types of dysrhythmia which were seen were

ventricular tachycardia 5(29.4%), atrial fibrillation 4(23.5%), SVT (17.6%), 2nd degree AV block, and 3rd-degree AV block each accounting for 2(11.8%), and premature ventricular contractions1 (5.9%). Cardiogenic shock 9(8.7%), left ventricular thrombus 4(3.9%), pericarditis 2 (5.1%), and LV aneurysm 1(1%) were detected as complications upon presentation.

3.5 Management of the patient with ACS

3.5.1 Pharmacologic treatment

Most of the patients have received antiplatelet agents, anticoagulants, and statins. Patients who

received Aspirin, Clopidogrel, and Statin before reaching ED were 24 (23.3%), 14(13.6%), and 11(10.7%), respectively. (Table 4)

Table 4: Treatment given for of patients with ACS presented to SPHMMC/AaBET hospital ED, Addis Ababa, Ethiopia from October 2017 to September 2019.

Treatment given	Yes	Started at ED	Started before ED (other facility)
Aspirin	103(100%)	79(76.7%)	24 (23.3%)
Clopidogrel	103(100%)	89(86.4%)	14(13.6%)
Statins	102(99.0%)	91(88.4%)	11(10.7%)
Anticoagulants	102(99.0%)	101(98.1%)	0(0%)
UFH	100(97.1%)	99(96.1%)	1(1.0%)
Warfarin	2(1.9%)	2(1.9%)	0(0%)
Beta Blockers	63(61.2%)	60(58.3%)	0(0%)
Metoprolol PO	57(55.3%)	55(53.4%)	2(1.9%)
Metoprolol IV	2(1.9%)	2(1.9%)	0(0%)
Labetalol IV	2(1.9%)	2(1.9%)	0(0%)
Atenolol	3(2.9%)	2(1.9%)	1(1%)
Morphine	34(33.7%)	31(30.1%)	3(2.9%)
Nitrates sub lingual	19(18.5%)	18(17.5%)	1(1%)
ACE inhibitors/Enalapril	51(49.5%)	43(41.7%)	8(7.8%)
Calcium Channel Blocker/ Nifedipine	2(1.9%)	1(1.0%)	1(1%)
Streptokinase	1(1.0%)	0(0.0%)	1(1%)

3.5.2 Reperfusion (Revascularization) therapy

The percutaneous coronary intervention was done at St. Peter hospital Cat lab for 39(37.9%) patients who were diagnosed with ACS in the ED. 78(75.7%) had undergone CABG. Only one patient 1(1%) received thrombolytic therapy at a private hospital.

3.6 Disposition

Eighty-two patients (79.6%) stayed in ED from 24 hours to 7 days. Eighteen patients (17.5%) stayed less than 24 hours in the emergency department and three (2.9%) stayed in the emergency department for more than a week.

Sixty-seven (65%) and 21(20.4%) patients were transferred to the cardiac ward and cardiac ICU of St. Peter hospital, respectively. In addition, one (1%) patient was transferred to another hospital, 1(1%) patient was transferred to SPHMMC ICU,

4(3.9%) patients were discharged to home, and 2(1.9%) patients were self-discharged.

Ninety-six (93.2%) patients who presented with ACS were discharged alive from the ED, while 7(6.8%) patients died in the ED.

4. Discussion

The majority of the patients who presented to the emergency department of SPHMMC diagnosed with ACS are males 64.5% with a M: F ratio of 2.03:1. This is comparable to the Western population and previous retrospective study done in BLH (65.2%), but it's lower than a study done in young sub-Saharan African countries (M: F was 6:1), Djibouti (7.7:1), Addis Cardiac clinic (83%) and BLH (75.8%). [5, 6, 7, 8]

The mean age of ACS patients coming to the ED was 55.65 ± 13.96 years, which is higher than that of young sub-Saharan African countries (34 ± 1.9), Djibouti (52 ± 11 years), and Addis Cardiac center (50-59 years) and comparable to a retrospective study done in BLH in 2013 (57.1 ± 13.7) and 2017 (56.3 ± 13.65). [28, 27, 29, 8]. However, this value is lower compared to the GRACE Global Registry of Acute Coronary Events 66.3 ± 10 years. [9]

The median time of presentation after the onset of symptom was 2 days which was more delayed than those seen in other places, which are in hours than in days. This significant delay in seeking medical care may be because of a lack of knowledge about signs of ACS and the benefit of visiting the nearby hospital early. In addition, most patients used taxi as a means of transportation rather than an ambulance, which may cause a delay in on-time arrival to the ED. It is comparable to a study done in TASH (3.8 days) in 2017. [5]

In this study, the commonest risk factor identified for ACS was Hypertension 45.6%. This value is comparable to a study done in Djibouti (46%) and lower than the study done in the Saudi Project

(55.3%), Addis cardiac center (61.2%), and TASH in 2017 (61.3%). Diabetes Mellitus was a risk factor in 30.1%, which is lower than that seen in the study done in Addis cardiac center in Ethiopia (41.4%) and Djibouti (49%). Smoking was found to be a risk factor in 13.6%, which is lower than a study seen by South African Indians (60%), Dakar (52.4%), and Djibouti (60%). Dyslipidemia accounted for 7(7.1%), which is lower than those seen in Saudi Project (41.1%), Addis Cardiac center (63%), and Djibouti (83%). [4, 6, 7, 10-12]

This could be due to less routine screening for dyslipidemia in outpatient follow-up clinics.

Chest pain was the commonest symptom patients present with, showed in a study done in Dakar; Senegal accounted for 95.2% of the patients and also in a study done in TASH in 2017(85.5%). These were higher than this study (76.7%) but comparable to a study done in Malaysia (72.0%). [5, 13, 14]

The mean systolic and diastolic blood pressure upon presentation in this study was 129.3 ± 36.4 and 79.2 ± 22.36 . This value is comparable to the retrospective study done in TASH and published in 2017, which was 135.5 ± 30.33 and 84.6 ± 21.11 for systolic and diastolic blood pressure, respectively. However, the heart rate was found to be slightly higher, with a mean of 98.84 ± 29.5 in this study and 93.2 ± 16.6 in the TASH study published in 2017. [5]

Echocardiography was done for all patients in this study, which is higher than the study published in TASH (69.4%). [5] The commonest echo finding was wall motion abnormality (85.4%) followed by decreased ejection fraction (60.2%). LV thrombus was seen in 3.9%. Compared to a study done in Dakar, Senegal, the rate of left ventricular thrombus seen is higher (20%), whereas the rate of decreased ejection fraction was lower (37.5%). Cardiogenic shock was seen in 8.7% in this study, slightly lower than 12.1% in the previous study.

This could be attributed to early diagnosis and treatment with a high suspicion rate despite these patients' late presentation. (5, 14)

STEMI is the predominant type of ACS that presents to the ED in studies done in Dakar (85.7%), Abidjan heart institute (71.5%), and BLH in Ethiopia in 2013(62%) and 72.6% in another study published in 2017 in TASH as it is seen in this study as well (71.8%). [8,11,16]. This value is higher than those seen in the GRACE study, which only accounted for 34%.[17] The percentage of patients who presented with Killip class I (37.3%) in this study is comparable to those in the study published in TASH in 2017 (33.3%). However, the rate of Killip class II and class III has decreased from 30.3 to 9% and 24.3% to 22%, respectively, compared to a study done in TASH in 2017. [5]

Reperfusion therapy is a treatment modality used to treat obstructive lesions. It can be done via medical reperfusion or percutaneous coronary intervention. PCI was done in 37.9% of the patients which is higher than Abidjan (22.5%). [16] However there was no patient who had primary PCI in this study. This could be because of the delayed presentation and diagnosis of a patient with STEMI. Only one patient received thrombolytic from a private setting in this study. However, thrombolytic was done in 44.4% of STEMI patients in a study in Dakar and 73% in a study done in Djibouti. [7, 14] Availing thrombolytic in public hospitals should be the priority in the future.

In this study, the in-hospital mortality of ACS patients was 6.8%, which is quite lower than TASH (27.4%). [5] This could be because of the start of reperfusion therapy at government hospitals like St Peter's cardiac center and early diagnosis and management in the emergency department.

Limitations

Our study has several limitations. First, as a hospital-based study, the observations made may not represent all cases of acute coronary syndrome in the community. Second, because of its small sample size, we could not use it for generalization. Third, we only included instances with a confirmed diagnosis of ACS and did not have an expert evaluate the ECG; therefore, there will be cases missed and incorrect interpretations.

Further study is required involving different facilities from different regions of Ethiopia to assess the pattern and outcome of acute coronary syndrome.

5. Conclusion

Most patients with acute coronary syndrome used a taxi than an ambulance and arrived late at the hospital. The commonest presentations were chest pain and easy fatigability. STEMI was the primary type of ACS identified. In the future, obtaining thrombolytic and moving toward primary PCI should be the top priorities in the treatment of ACS at public referral hospitals.

Abbreviations

ACS-Acute coronary syndrome; BLH-Black Lion Hospital; CABG-Coronary Artery Bypass Graft; CAD-coronary artery disease; ECG – Electrocardiograph; ED-Emergency Department; IHD-ischemic heart disease; MI-Myocardial Infarction; NTSEMI-Non ST-segment Elevation Myocardial Infarction; PCI- Percutaneous Coronary Intervention; SPHMMC-St Paul's Hospital Millennium Medical College; STEMI- ST-segment elevation myocardial infarction; TASH-Tikur Anbessa Specialized Hospital

Author Contributions

Both authors made substantial contributions to the conception and design, acquisition of data, or analysis and interpretation of data; took part in

drafting the article and revising it critically; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Funding

There was no funding to report.

Conflict of Interest

The authors declare that they have no conflicts of interest for this work.

Data Availability

Data will be available upon request from Corresponding author.

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