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A PROSPECTIVE OBSERVATIONAL STUDY ON PRESCRIBING PATTERNS OF DRUGS IN ACUTE CORONARY SYNDROME AT A TERTIARY CARE HOSPITAL, BENGALURU.

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ABSTRACT

Background: A prospective observational study on patients who were diagnosed with Acute coronary syndrome and who met the inclusion criteria was carried out in the Coronary Care Unit of a tertiary care hospital, Bengaluru. **Aim:** The aim of the study is to analyze the prescription pattern for the drugs prescribed to the patients with ACS by checking the compliance with the standard guidelines provided by the ACC/AHA. **Materials and Methods:** A prospective observational study for a period of 6 months was conducted in the CCU department of a tertiary care hospital. The percentage of the data was calculated using Microsoft Excel 2016. **Results:** A total of 101 patients were enrolled in the study in which males were 69(68.31%) followed by females 32 (31.68%) and were found in the age group of 41-66 years 73 (72.2%). Diabetes +hypertension + dyslipidemia 45(44.55%) were found to be the co-morbidities. The prescribing patterns of DAPT-101(100%), anti-hypertensives-93(92.07%), statins-77(76.23%), anti-coagulants- 43(42.57%), anti-anginal drugs and diuretics were 36(35.64%), fibrinolytics were 04(03.96%). **Conclusion:** The present study concludes that maximum patients were greater than 60 years of age and with male predominance. DPAT with Clopidogrel and Aspirin was given to all the patients diagnosed with ACS as per ACC/AHA guidelines. Majority of the patients received all the required drug therapy which is in compliance with ACC/AHA guidelines.

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INTRODUCTION

Cardiovascular disease (CVD) is a kind of diseases that deals with the heart or blood vessels. ^[1] Cardiovascular disease involves coronary artery diseases (CAD) such as angina and myocardial infarction (commonly certified as heart attack). ^[1] Other CVDs are stroke, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, heart arrhythmia, congenital heart disease, aortic aneurysms, peripheral artery disease, valvular heart disease and venous thrombosis. ^{[1], [2]}

Emerging field of cardiovascular diseases, acute coronary syndrome is the leading cause of morbidity and mortality worldwide. The term acute coronary syndrome refers to the any group of clinical symptoms compatible with myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina to ST-Elevated myocardial infarction to Non ST-elevated myocardial infarction. STEMI occurs by developing a complete occlusion of a major coronary artery which is previously affected by atherosclerosis. NSTEMI and UA are closely related conditions as their pathophysiologic origins and clinical presentations are similar, but they differ in severity. These are associated with rupture of an atherosclerotic plaque and complete or partial thrombosis of the infarct artery.³

NSTEMI arises when the ischemia is sufficiently severe to cause myocardial damage which results in the release of a biomarker of myocardial necrosis into the circulation (cardiac-specific troponins T or I, or muscle and brain fraction of creatine kinase [CK-MB]). In contrast, the patient is considered to have experienced UA if no such biomarker can be detected in the bloodstream hours after the initial onset of ischemic chest pain. Unstable angina exhibits 1 or more of 3 principal presentations: (1) rest angina (usually lasting >20 minutes), (2) new-onset (< 2months previously) severe angina, (3) crescendo pattern of occurrence (increase in intensity, duration, frequency). An acute coronary syndrome may occasionally occur in the absence of electrocardiographic changes or elevations in biochemical markers, when the diagnosis is supported by the presence of prior documented coronary artery disease or subsequent confirmatory investigations⁴.

In addition to primary prevention efforts, joint guidelines by the American College of Cardiology (ACC) and the American Heart Association (AHA) suggests that secondary drug prevention measures to be used in patients with ACS. ^{5, 6}. In conjunction with diet and lifestyle modifications, these guidelines suggest the use of statin, beta-blocker, and renin-angiotensin aldosterone system inhibitor drug therapies in ACS patients. Long term survival rate in post-acute coronary syndrome patients depends to a large extent on how well post A.C.S. period is managed. ^{5, 6} Therefore, this study was designed to study the pattern of prescription of various drugs in 101 patients of acute coronary syndrome admitted in cardiac care unit.

AIM:

To assess the prescribing patterns of drugs used in patients with Acute Coronary Syndrome in the CCU of a tertiary care hospital.

OBJECTIVES:

- ❖ To analyze the demographic characteristics of patients.
- ❖ To identify most commonly occurred co-morbid conditions associated with ACS.
- ❖ To analyze the different categories of clinical presentation for the different types of ACS.
- ❖ To assess the WHO core prescribing indicators :
 - a. Names, dose, dosage regimen of all drugs.
 - b. Average number of drugs per prescription.
 - c. % of drugs prescribed by generic name.
 - d. % of encounters resulting in prescriptions of an antibiotics.
 - e. % of encounters resulting in prescriptions of an injections.
 - f. % of drugs prescribing from National List of Essential Medicines (NLEM).

METHODOLOGY:

STUDY SITE:

The study was carried out at Aster CMI hospital, sahakara nagar, Bengaluru. Aster CMI hospital is one of the India's leading health care institutions offering multispecialty tertiary care of international standards. It is a 500 bedded hospital providing tertiary level multi-specialty care and multi-organ transplantation services. It also provides specialized services in Cardiology, Internal medicine, Gastro-enterology, Nephrology, Urology, Neurology, CTVS, Gynecology and Orthopedics.

STUDY DESIGN:

A Prospective observational study.

STUDY CRITERIA:

The patients visiting Coronary care unit (CCU) were enrolled in the study after taking their consent and by considering the following inclusion and exclusion criteria.

Inclusion Criteria:

1. All the In-patients diagnosed with acute coronary syndrome by a consultant interventional cardiologist, in the coronary care unit were enrolled.
2. Patients with other co-morbid conditions.
3. Patients in 18 years and above.

Exclusion Criteria:

1. Patients who were under day care management,
2. Patients who are <18years, Pregnant and lactating woman.

DATA COLLECTION:

The data was collected from the patients who met inclusion criteria. To study the prescribing patterns, relevant details of every in-patient with acute coronary syndrome were collected in suitably designed proforma. The relevant data on drug prescription of each patient was collected from In-patient record. The demographic data (age, sex), the diagnosis, co-morbid conditions, risk factors identified for developing acute coronary syndrome of each patient were noted from the medical records. The drug data – drugs, dosage form, dose, route of administration, frequency were noted. The laboratory parameters which were monitored during treatment such as electrolytes, blood glucose levels, CK-MB, troponin's- I and T, prothrombin time and INR, Lipid profile, blood pressure and Sr. creatinine levels were also recorded.

STUDY PROCEDURE:

The following data was collected and recorded in the data collection form - demographic details (age, sex), drugs (name of the drug, dosage form, dose, route of administration, frequency), co-morbidities and principal diagnosis. To study the prescribing patterns in acute coronary syndrome, all the patients who were included in the study were considered for analysis. The trade names of drugs were deciphered and classified into pharmacological groups that included Anti-platelet agents, statins, Anti-hypertensive drugs, Anti-anginals, Anti-coagulants, Diuretics, diabetic drugs and other miscellaneous drugs. Pattern of different classes of drugs as well as individual drugs was analyzed and presented as percentage. Each prescription was critically analyzed using WHO prescribing indicators to evaluate rationality of the prescriptions as well as in compliance with ACC/AHA guidelines.

STATISTICAL ANALYSIS:

Data was entered in MS Excel 2016 and analyzed. Descriptive statistics expressed in terms of actual numbers and percentage was used for data analysis.

ETHICAL CONSENT:

The protocol of the present study was approved by the ethical committee at Aditya Bangalore institute of pharmacy education and research.

RESULTS

A total number of 101 patients were enrolled in the study of which 69(68.31%) were male patients and 32(31.68%) were female patients. The male to female ratio among patients was 2:1. The incidence of acute coronary syndrome was more common in male compared to female. Gender wise distribution and age wise distributions are shown in fig.1.

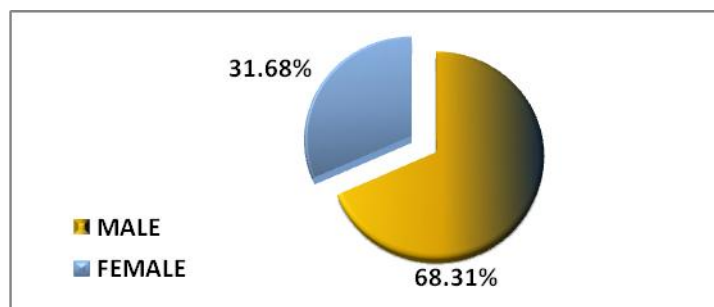


Fig.1: Gender wise distribution of patients with ACS.

The patients were divided into 8 groups based on their age groups being kept at an interval of 10 years (fig.2). Age group wise categorization of the patients: Cardiac disorders progresses with the advancing age. When categorized age group wise, maximum number of patients 39.60% were from the age group of 61-70 years, followed by 18.81% were from 51-60 years. There was significantly lower number of patients in the younger age i.e., 1.98% of 21-30 years and 3.96% in the elderly age group of 81-90 years.

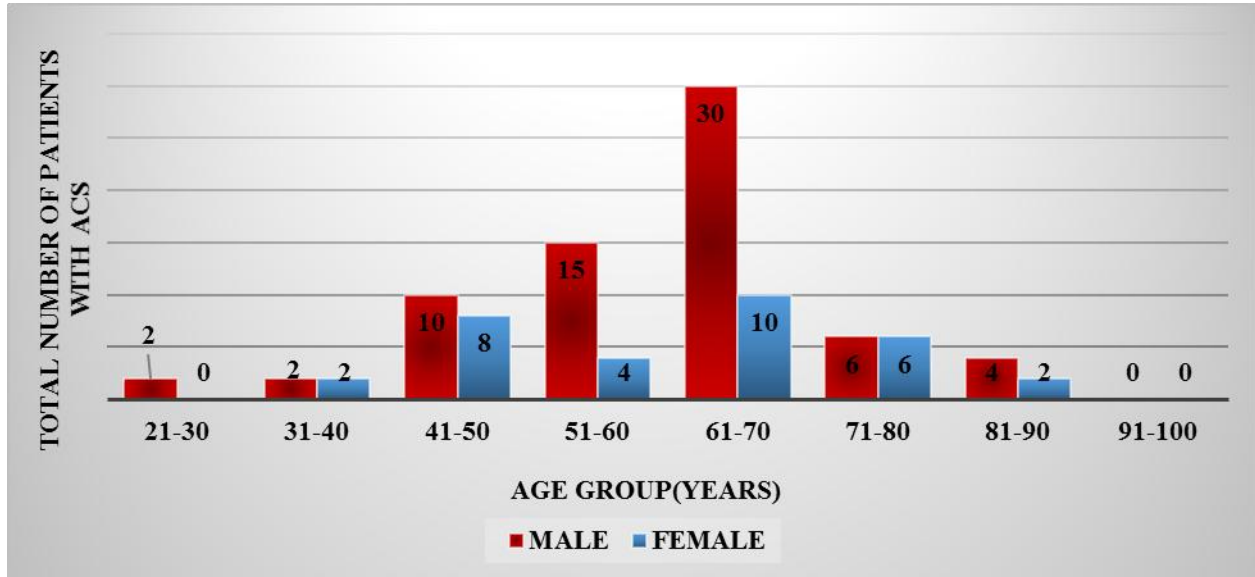


Fig.2: Age group wise distribution of ACS patients.

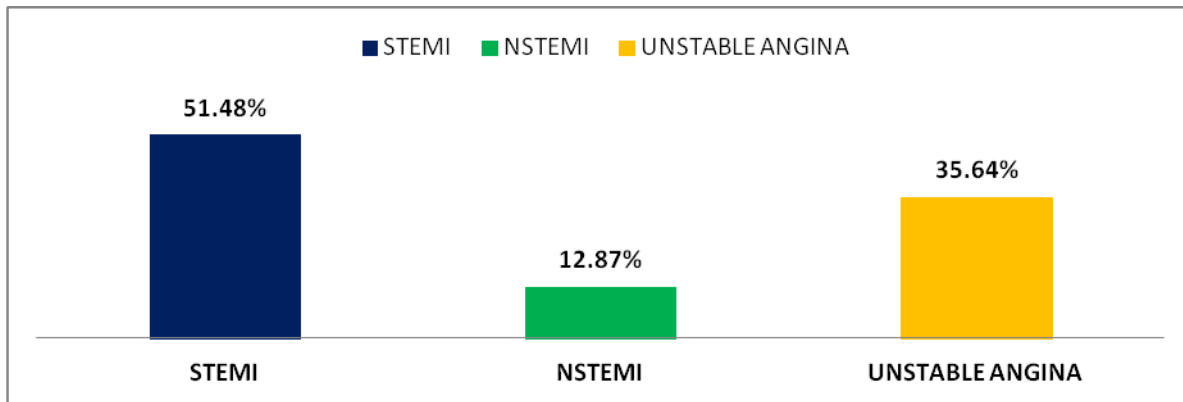


Fig.3: Different types of ACS.

In this study, three different types of acute coronary syndrome were encountered during our study which includes 52(51.48%) patients are with STEMI, 13(12.87%) are with NSTEMI and 36(35.64%) are with Unstable angina (Fig.3).

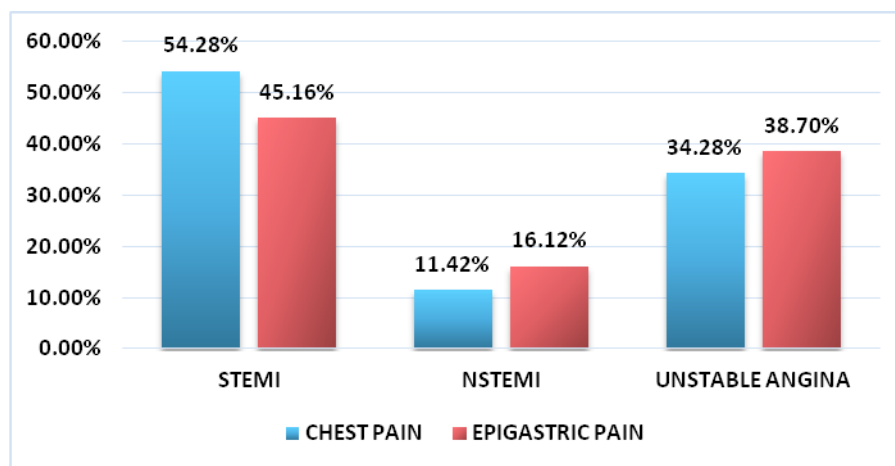


Fig.4: Clinical presentation of ACS.

In our study, for chest pain (CP), most patients present by STEMI constituting 38(54.28%), followed by NSTEMI and Unstable angina representing 08(11.42%), 24(34.28%). Out of 31 patients presenting with epigastric pain, 14/31(45.16%), 5/31(16.12%) and 12/31(38.70%) were found with STEMI, NSTEMI and Unstable angina. In regard to ACS and Electrocardiogram leads involved, of the 21 patients with AAMI, 15/21(71.42%), 03/21(14.28%) and 03/21(14.28%) patients were found with STEMI, NSTEMI and Unstable angina and for inferior 10/20(50%), 6/20 (30%),4/20(20%) patients were found with STEMI, NSTEMI, UA.

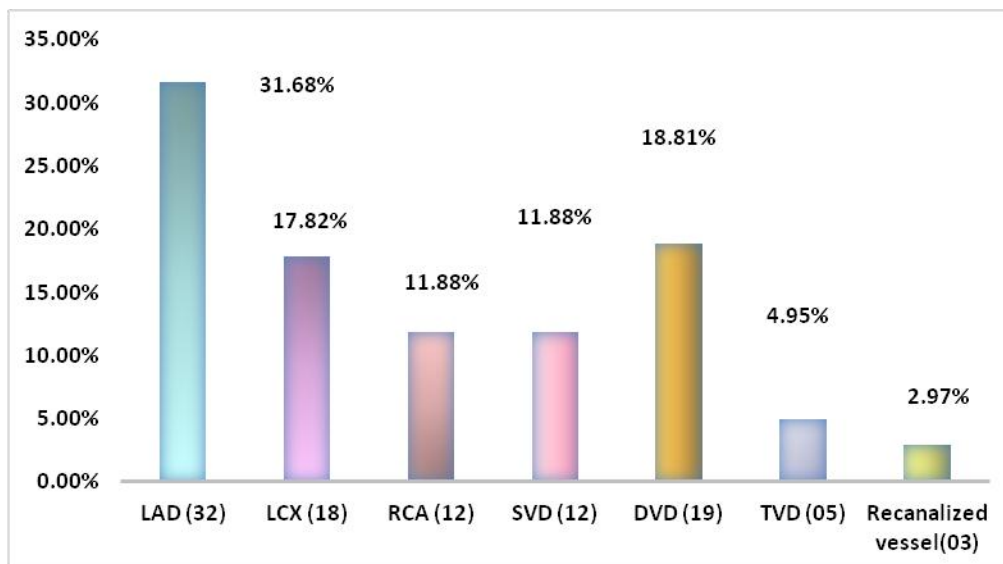


Fig.5: Angiogram data.

In our study, all the patients who were presented with Acute coronary syndrome underwent Coronary angiogram, and among these, the majority of the patients had DVD 72.72% (n=32) with LAD lesion being the most common culprit vessel in 31.68% (n=32) patients followed by LCX and RCA. Only 11.88% (n=12) and 07.92% (n=08) of patients had SVD and TVD respectively.

Various co-morbid conditions like hypertension, type-II diabetes mellitus, dyslipidemia, hypothyroidism were seen among patients and many of these were found to be risk factors for acute coronary syndrome. Hypertension, type-2 Diabetes mellitus and Dyslipidemia were the most common co-morbid conditions found in the most of the patients which increases the risk of acute coronary syndrome (Table 1). Treatment of Acute coronary syndrome involves Oxygen supply and different categories of drugs namely, anti-platelet drugs, anti-anginal drugs, fibrinolytics, anti-coagulants, antibiotics, dyslipidemia agents, anti-hypertensives. The patterns of these drugs were recorded and analyzed (Table 2).

Table 1: Details of patients based on Co-Morbid Conditions.

CO-MORBID CONDITIONS	NUMBER OF PATIENTS	PERCENTAGE(%)
Hypertension	12	11.88%
Hypertension+ Type-2 DM	27	26.73%
Hypertension + Dyslipidemia	13	12.87%
Hypertension+Type-2 DM+ Dyslipidemia	45	44.55%
Hypertension + Type-II DM + Dyslipidemia + Hypothyroidism + CKD + Seizures	04	03.96%

Table 2: Different classes of drugs prescribed to the patients.

Drug categories	No. of Patients (101)	Percentage(%)
Anti-platelets	101	100.00%
Anti-anginals	36	35.64%
Anti-hyperlipidemics	77	76.23%
Anti -hypertensives	93	92.07%
Diuretics	36	35.64%
Anti-coagulants	43	42.57%
Fibrinolytics	04	03.66%
Anti-diabetics	45	44.55%

In our present study, Oxygen supply had been given to all the 101 patients (100%) and different combinations of Anti-thrombotic drugs, which includes the anti-platelet drugs (Aspirin, clopidogrel), Anti-coagulants (Heparin, Enoxaparin sodium), Fibrinolytics (Streptokinase), Diuretics were prescribed. The percentage and number of patients received anti-thrombotic drugs is shown in Table 3.

Table 3: Combination of Anti-Thrombotic Drugs Prescribed to the Patients.

Drug combination	No. of Patients	Percentage (%)
Anti-platelets	56	55.44%
Anti-platelets + Anti –coagulants	41	40.59%
Anti-platelets + Anti -coagulants + Fibrinolytics	04	03.96%

The Anti-platelet drugs aspirin and clopidogrel were used to reduce the cardiovascular mortality and non-fatal myocardial infarction in acute coronary syndrome. Among 101 prescriptions analyzed anti-platelets were prescribed in 101 patients (100%). Details of anti-platelet drugs prescribed are shown in Fig.6. All these drugs were prescribed in oral dosage form.

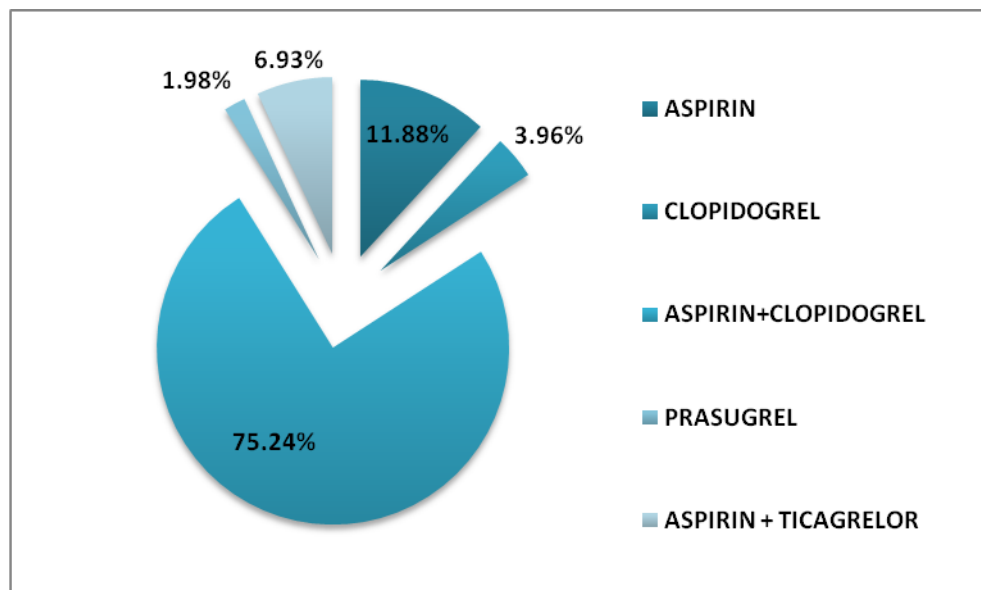


Fig.6: Percentage of Antiplatelets prescribed to patients.

In our present study, Anti-platelets which were prescribed to patients include “prasugrel” -a third generation thienopyridine given in 02 patients (01.98%) who experienced diminished response from Clopidogrel. And also combination of “Low-dose aspirin with Ticagrelor” was prescribed among 07 patients (06.93%) who had H/O MI and with stent thrombosis – which was a new finding in our study compared to previous studies conducted.

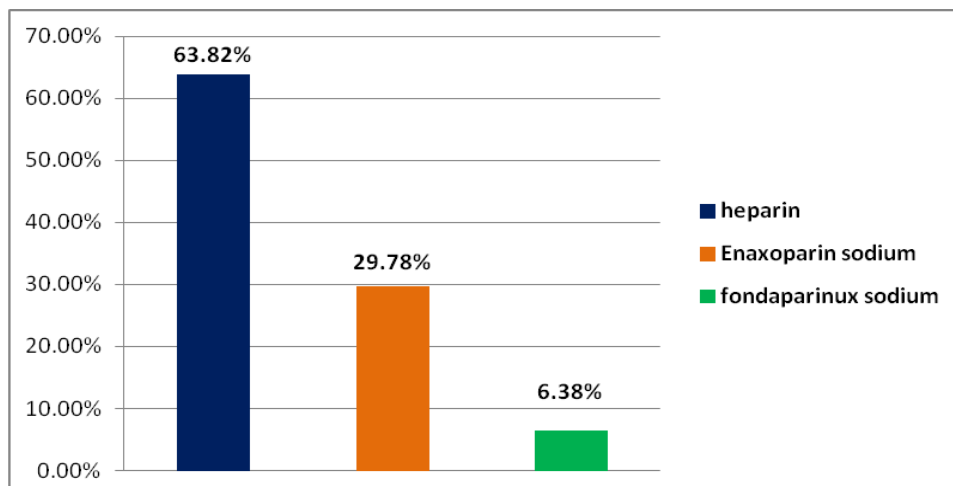


Fig.7: Percentage of Anti-coagulants prescribed to patients.

Anti-coagulant drugs prescribed include low molecular weight heparins as well as selective factor-X_a inhibitors. Details of Anti-coagulants prescribed in Fig.7. These are prescribed in the form of injections given either by SC or IV route of administrations.

Details of prescribed Anti-anginal drugs (fig.8), Anti-hyperlipidemics (fig.9), Anti-hypertensives (fig.10), % of combinations of Anti-hypertensives (fig.11), Diuretics (fig.12), are as follows.

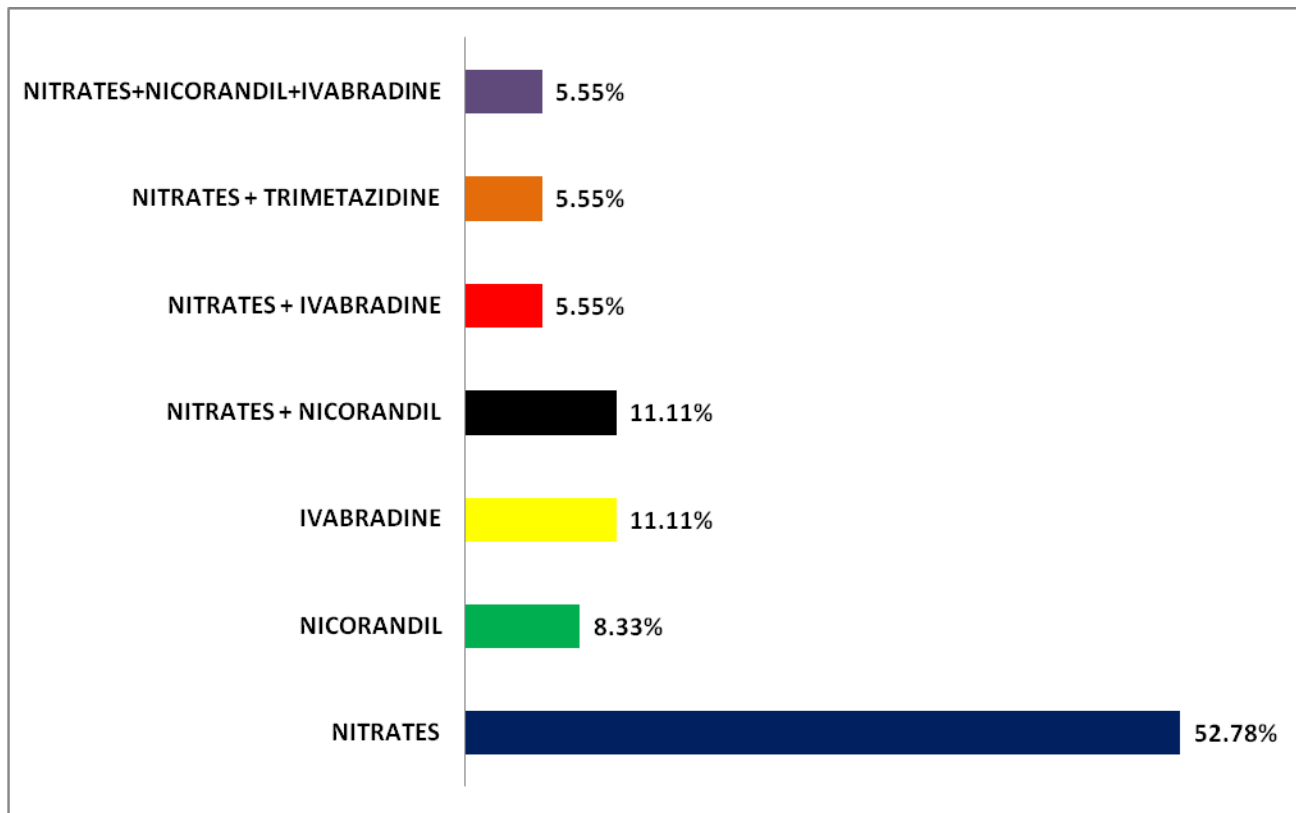


Fig.8: Details of anti-anginals prescribed to the patients.

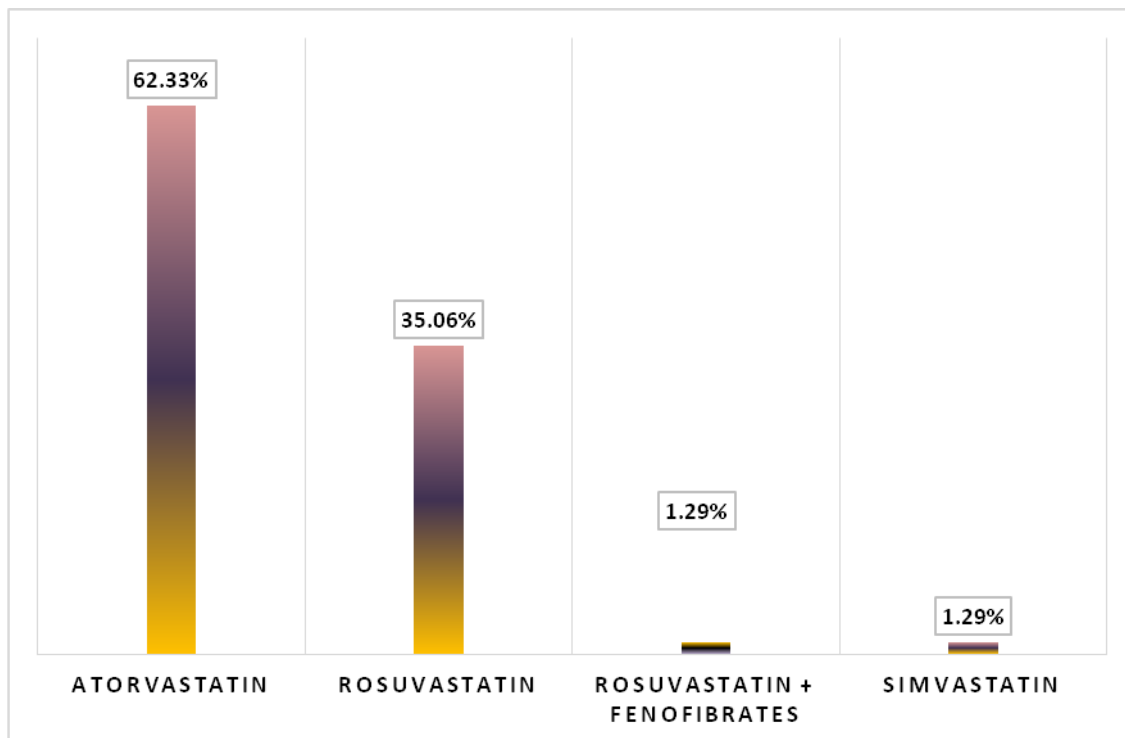


Fig.9: Details of Anti-hyperlipidemics prescribed to the patients

Fig.10: Details of Anti-hypertensive drugs prescribed to the patients.

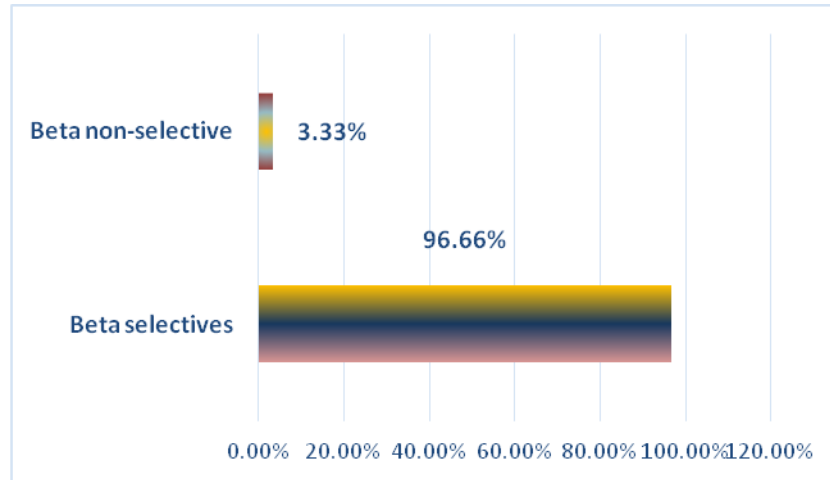


Fig.10a: % of Beta blockers prescribed to the patients.

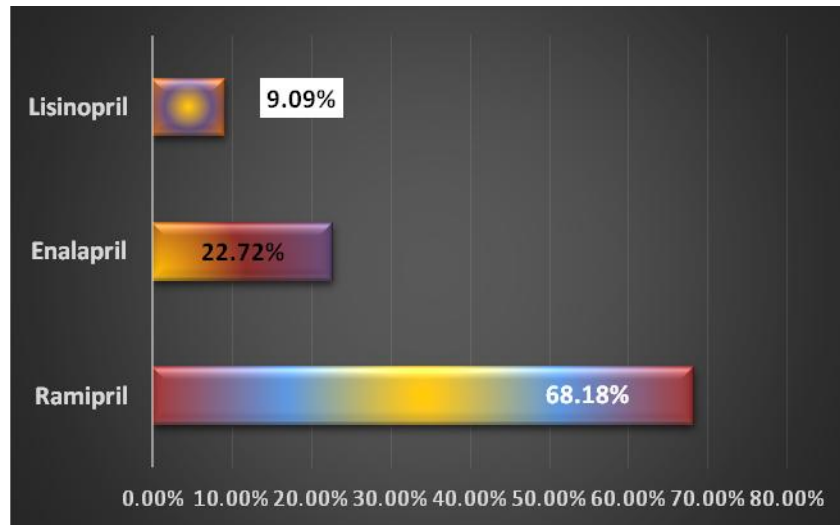


Fig.10 b: % of ACE Inhibitors prescribed to the patients.

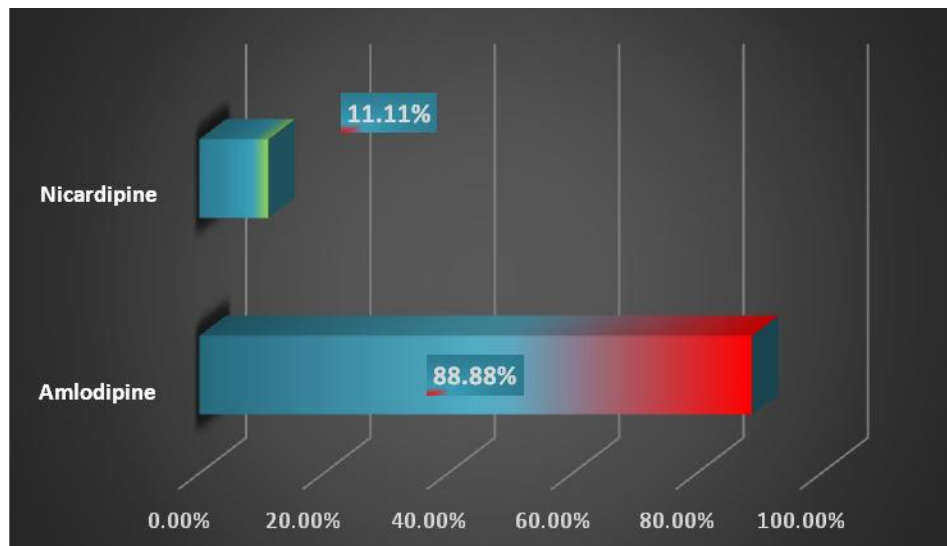


Fig.10c: % of CCB's prescribed to the patients.

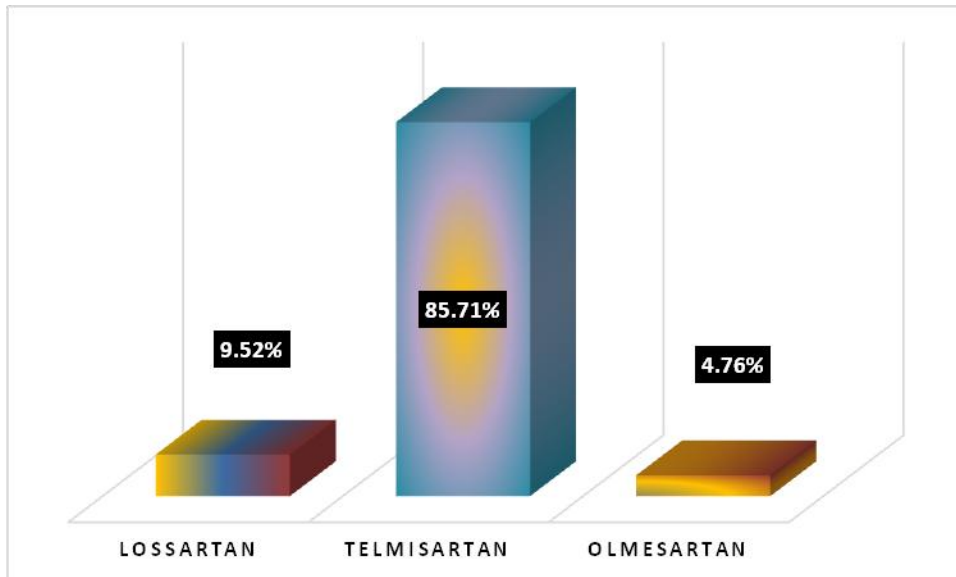


Fig.10d: % of ARB's prescribed to the patients.

Table.4: % of Alpha + beta blockers prescribed to patients.

Alpha + Beta blockers	No. of patients (10)	%
Carvedilol	10	100%

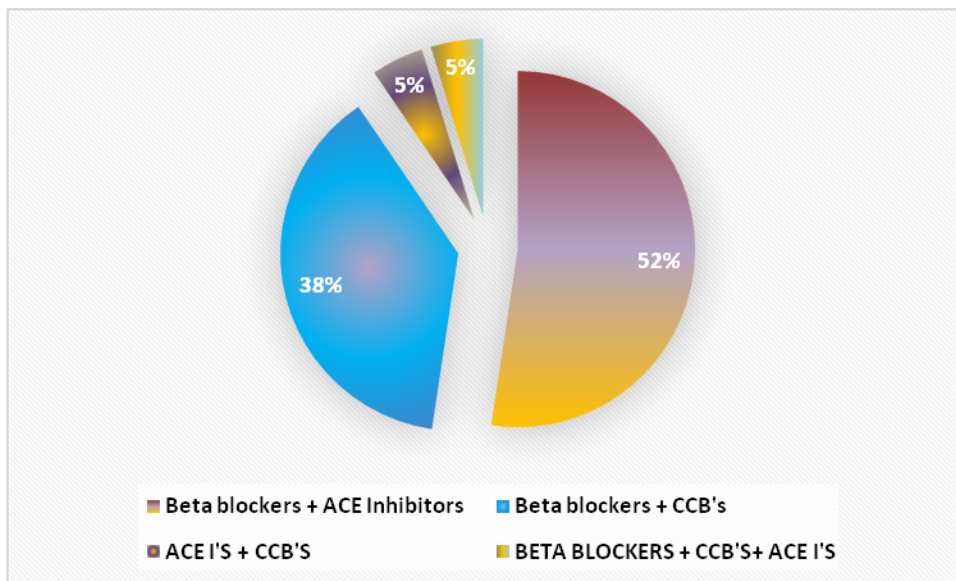


Fig.11: % of Combination of Anti-hypertensives prescribed to the patients

Table.5: % of Fibrinolytics prescribed to patients.

FIBRINOLYTICS	No. of patients (04)	%
Streptokinase	04	03.96%

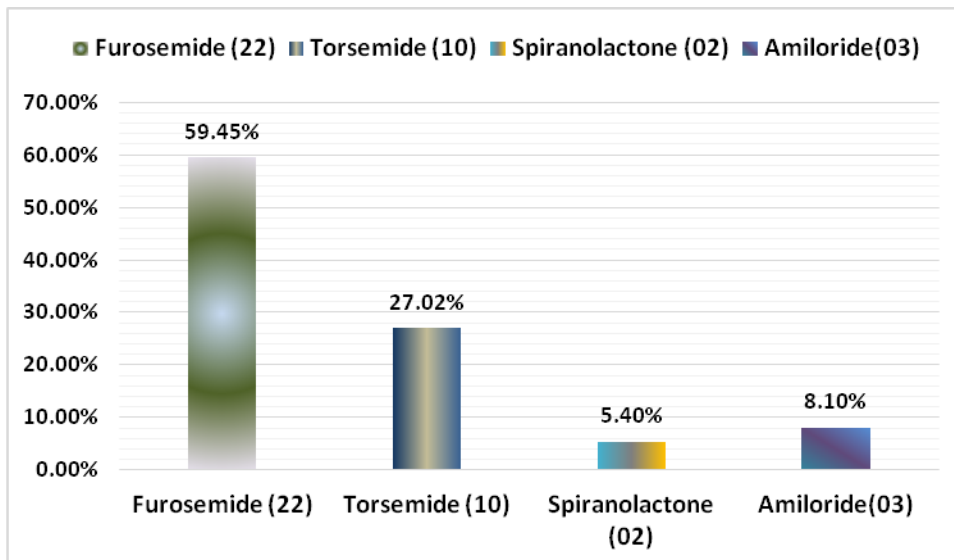


Fig.12: % of Diuretics prescribed to patients.

Table.6: % of Miscellaneous drugs prescribed to patients.

MISCELLANEOUS DRUGS	NUMBER OF PATIENTS (101)	%
PANTOPRAZOLE	52	51.48%
NSAID'S	24	23.76%
THYROXINE SODIUM	05	04.95%
AMITRYPTYLIN	04	03.96%
AMIODARONE	05	04.95%
ALPRAZOLAM	08	07.92%
FERIUM XT	03	02.97%

Table.7: % of Anti-Diabetic drugs prescribed to patients.

ANTI-DIABETIC DRUGS	NO. OF PATIENTS (45)	%
HUMAN ACTRAPID	38	84.44%
METFORMIN + GLIMEPRIDE	07	15.55%

Out of 101 patients, 45(44.55%) patients had diabetes mellitus. Most of the patients were prescribed with Human actrapid insulin 38(84.44%) during hospital stay of treatment. The doses of insulin were given based on the blood glucose levels. Very few patients were prescribed with oral hypoglycemic agents 07(15.55%).

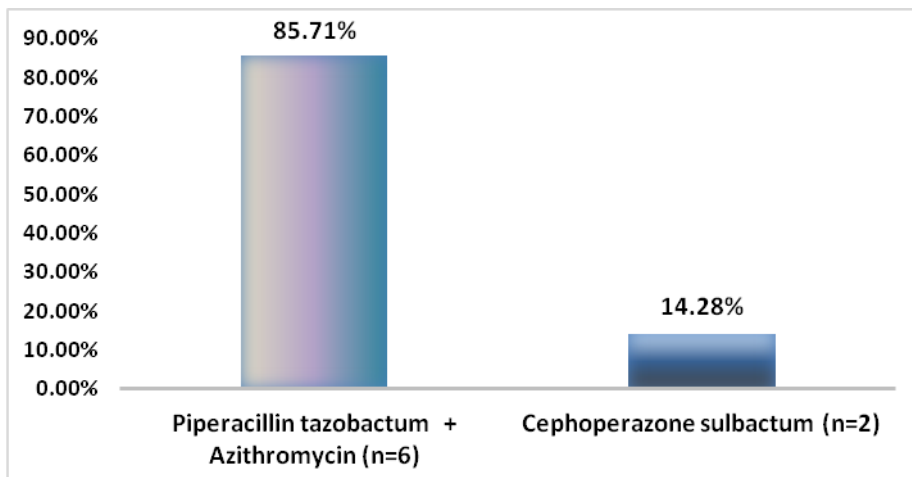


Fig.13: Antibiotics prescribed to patients.

The frequency of use of antibiotic administrations was found to be 13.86% in ACS in comparison with previous studies. In our present study, out of 101 patients 06 patients had diagnosed with pneumonia and culture tests revealed that presence of streptococcus pneumoniae. So in view of pneumonia, inj. Piperacillin tazobactam along with tab. Azithromycin has been given to 6 patients and among 2 patients inj. Cefoperazone sulbactam was given due to acute pyelonephritis in view of Klebsiella in culture tests.

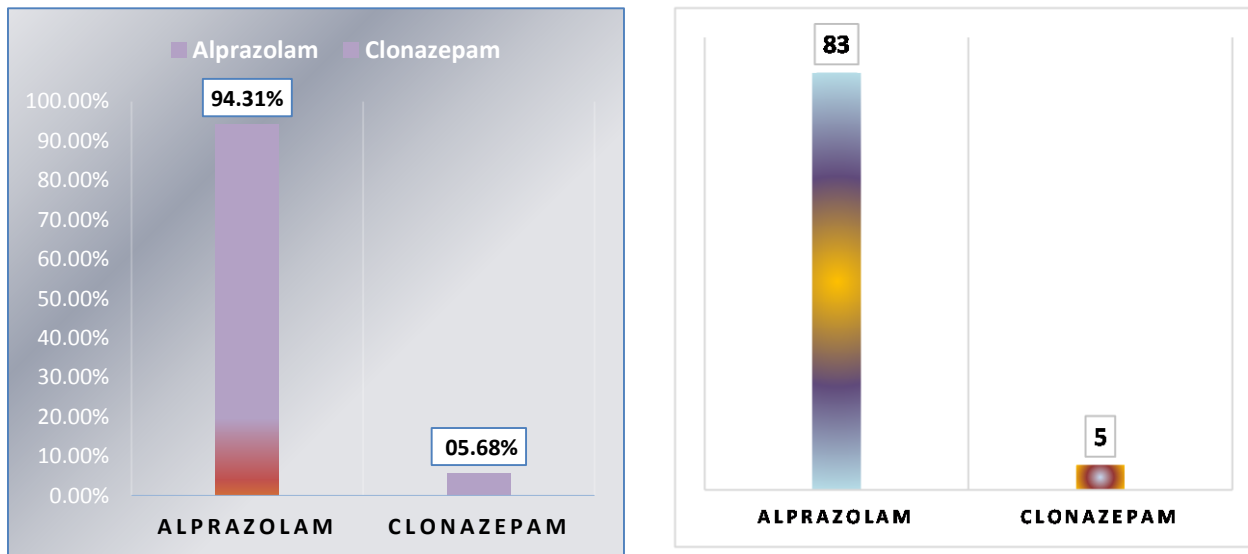


Fig.14 &14a: Percentage of patients received Benzodiazepines during their hospital stay.

According to ACC/AHA guidelines, a mild tranquilizer usually benzodiazepines should be considered in very anxious patients. In our study, Benzodiazepines has been prescribed among 88 patients. Out of 88 patients, Alprazolam has been prescribed in maximum patients i.e., 83(94.31%) and clonazepam in only 5 patients (05.68%), which was a new finding in our study compared to previous studies conducted.

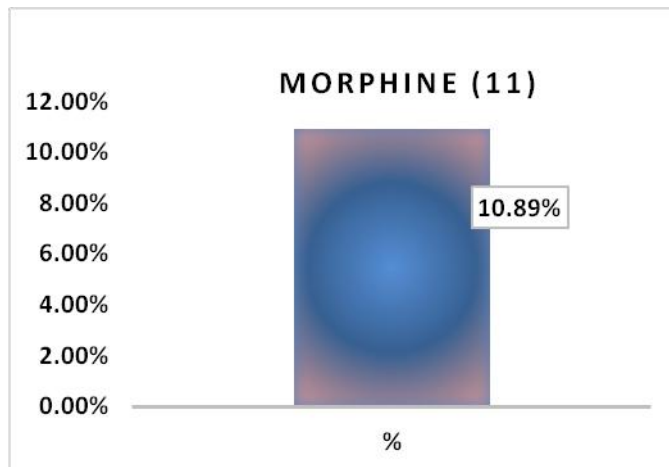


Fig.15: Percentage and Number of patients received Opioid’s in patients with ACS.

According to 2013 AHA/ACC STEMI Guidelines, "In the absence of a history of hypersensitivity, morphine sulfate is the drug of choice for pain relief in patients with STEMI, especially those whose course is complicated by acute pulmonary edema. In our present study, among 101 patient’s morphine sulphate was given to 11 patients (10.89%) along with an “anti-emetic Ondansetron was given to all 11 patients who received morphine” to prevent drug induced nausea and vomiting which was a new finding in our study compared to previous studies conducted.

Table.8: Reperfusion strategy.

Reperfusion strategy	No. of patients	%
No reperfusion(Recanalized)	03	02.97%
Thrombolytics	04	03.96%
PCI	86	85.14%
CABG	08	07.92%

Primary PCI was successfully carried out in 86 (85.14%) patients while 02.97% (n=03) of patients had recanalized vessel without significant lesion who were further managed by guideline directed medical therapy. In the remainder, 03.96% (n=04) thrombolytic therapy was initiated followed by medical management due to insignificant CAD detected on coronary angiogram. We report no major adverse cardiovascular outcomes including CV death during our study period.

Table.9: Pre – discharge LV function.

Pre - discharge LV function(%)	No. of patients (%)
EF preserved (>50)	91(90.09%)
EF mildly reduced (41-50)	08(07.92%)
EF moderately reduced (31-40)	02(01.98%)
EF severely reduced(<30)	00(00.00%)

Pre-discharge echocardiogram showed preserved LV function in 90.09% (n=91) reflecting timely institution of treatment for ACS, thus avoiding significant myocardial damage. In the remainder 07.92% (n=08) had mild LV dysfunction and only 01.98% (n=02) had moderate dysfunction. None of them had severe ventricular dysfunction. There was no In-hospital mortality reported among our study participants reflecting improved strategies involving reperfusion therapy and management of acute coronary syndrome during our study period.

Table.10: WHO core prescribing indicators.

WHO PRESCRIBING INDICATORS	NUMBER / %
TOTAL NUMBER OF PRESCRIPTIONS	101
TOTAL NUMBER OF DRUGS PRESCRIBED	575
AVERAGE NUMBER OF DRUGS PER PRESCRIPTION	05.80
% OF DRUGS PRESCRIBED BY GENERIC NAME (N = 348)	60.52%
% OF ENCOUNTERS WITH ANTIBIOTIC PRESCRIBED (N=14)	13.86%
% OF ENCOUNTERS WITH INJECTIONS PRESCRIBED (N = 137)	23.37%
% OF DRUGS PRESCRIBED FROM ESSENTIAL DRUG LIST (N = 564)	98.08%

WHO has given three types of indicators namely prescribing indicators, patient care indicators and facility indicators as determinant of rational prescribing. Out of these, in this study prescribing indicators has been analyzed. The total number of drugs prescribed among 101 in-patients with the diagnosis of acute coronary syndrome included in the study was 575. The average number of drugs per patient was determined to be 05.80. The number of drugs prescribed by generic name was 348(60.52%). The percentage of encounters with antibiotics was found to be 13.86%. The percentage of encounters with injections was found to be 23.37%. while the drugs prescribed from Essential drug list was found to be 98.08% which was in accordance with WHO.

DISCUSSION

The term Acute coronary syndrome refers to range of myocardial ischemic states. It encompasses ST-Elevated myocardial infarction, NST-Elevated myocardial infarction and Unstable angina.⁷ Myocardial infarction is the common clinical presentation of ischemic heart disease. It is the sudden death of myocardium from sudden blockage of coronary artery by a blood clot. So, a prescription based study is considered to be one of the most effective way which have been used to evaluate the prescribing habit of physicians.^{8,9}

In the present study, out of 101 patients, 69(68.31%) were Males and 32(31.68%) were females. Average age was between 61-70 years of male (65 years) and of women was 63 years (range 61-70 years). In this study, different types of CAD were identified which includes includes 52(51.48%) patients are with STEMI, 13(12.87%) are with NSTEMI and 36(35.64%) are with Unstable angina. The results found to be consistent with study conducted by González-Pacheco et al and indicated that male were more prone to coronary artery disease compared to females and risk increased with age. Treatment of ACS involves categories of drugs namely Anti-platelet drugs, anticoagulants, fibrinolytics, anti-anginals, anti-hypertensives, anti-hyperlipidemics, antidiabetics, antibiotics, miscellaneous drugs etc. were enrolled.¹⁰

The prescription pattern studies have been conducted widely and it is being carried out in different health care setups. Such studies are helpful to determine the behavior of the use of medicines in a society. A survey based on prescription is considered to be one of the most cost effective methods to determine the prescribing approach of physicians.

The present study is an attempt to evaluate the pattern of prescriptions of the patients with ACS admitted in CCU in a tertiary care hospital, Bengaluru.

In a study conducted by Kamath A et al., of the 349 patients, 81% were males and 19% females and 40% were more than 65 years of age.¹¹ In a retrospective study conducted by Tasneem Sandozi and Fouzia Nausheen, of the 150 patients was studied, 78 of these patients were men and 72 of them were women. Average age of men was 61 years (Range 36-83 years) and of women was 60 years (Range 30- 80 years).¹² In the present study, out of 101 patients, 69(68.31%) % were Males and 32(31.68%) were females. Average age was between 61-70 years of male (65 years) and of women was 63 years (range 61-70 years). The results of this study were found to be in consistence with previous studies and indicated that male were more prone to coronary artery disease compared to female and the risk increased with increasing age.

In the present study, the drug prescription rates of anti-thrombotic agents were 100%, beta-blockers 29.70%, ACE inhibitors were 21.78% angiotensin receptor blockers were 20.79% and lipid lowering drugs were 76.23% respectively. In a study conducted by Jorg Muntwyler, et al.,¹³ the drug prescription rates for antithrombotic agents, beta-blockers, ACE-inhibitors/angiotensin receptor blockers and lipid lowering drugs were 91%, 58%, 50% and 63% respectively.¹³ The prescription rate of lipid lowering drugs in this study were comparatively very high than the previous study.

In a study conducted by Tasneem Sandozi and Fouzia Nausheen the drug utilization of various antiplatelet drugs was as aspirin alone 25.71%, aspirin & clopidogrel 60.00%¹², whereas in the present study, the prescription rate of aspirin alone was 11.88%, aspirin and clopidogrel was 75.24%. In the present study, the combination of aspirin and clopidogrel were prescribed in more number of patients compared to previous study. The association of physicians of India recommends that all patients with myocardial infarction should receive dual antiplatelet therapy. It was told in another study that Aspirin along with Clopidogrel may offer benefits over either drug used alone in Ischemic heart disease associated with Hypertension and Diabetes mellitus.

In the present study, the prescription rate of low molecular weight heparin was 93.61% and selective factor-X_a inhibitors like Fondaparinux was prescribed 06.38%. In a study conducted by Tasneem Sandozi and Fouzia Nausheen¹² drug prescription rates for unfractionated heparin was 55.71%, Low molecular weight heparin was 20.00%. In another study by Banerjee S., et al., unfractionated heparin was used in 36.8% of the patients and low molecular weight heparin in 25.2% patients. The prescription rate of Low molecular weight heparin was comparatively very high than previous study.

In a study conducted by Supratim Datta the overall use of anti-hypertensives in coronary artery disease was follows, ACEIs (42.3%), Calcium channel blockers (73%), Beta blockers (37.2%).¹⁴ A study conducted by Jorg Muntwyler, et al.,¹³ observed the drug prescription rates for beta-blockers, ACE-inhibitors/angiotensin receptor blockers as 58% and 50% respectively. In the present study, the use of anti-hypertensives were as follows calcium channel blockers were 17.82%, ARB's were 20.79%, combination of alpha + beta blockers were 09.90%, ACE-Inhibitors were 21.78% and Beta blockers were 29.70%. The previous study indicated high use of calcium channel blockers, whereas in the present study, beta-blockers were found to be the preferable choice of anti-hypertensive prescribed more frequently.

The prescription of diuretics was recorded as 36.63% which include furosemide 59.45% (22), torsemide 27.02% (10), spironolactone 5.40% (02) and amiloride 8.10% (03). The results of this study were varied slightly from previous study conducted by N sujana priya et al.¹⁵

The average number of drugs per prescription was 05.80. which was comparably lower when compared to other studies done by Afroz et al (8.8)¹⁶ and Nagabushan et al (7.8±2.2)¹⁷. This difference in values could be probably due to variation in associated comorbid conditions among population and the difference in prescription pattern among physicians. It is necessary to keep mean number of drugs as low as possible to minimize the adverse effects, potential drug-drug interactions and to reduce the cost of treatment. Also the WHO standard or ideal value for average number of drugs per prescription was 1.6-1.8. Though our study showed polypharmacy, the associated comorbid illnesses warrant increased drug prescription.

In a study done in emergency department, the drugs prescribed from the WHO essential medicine list comprised only 64.94% of drugs. It was also said that, this proportion should have been higher since this list of drugs is prepared with regard to public health relevance, evidence on efficacy and safety of the drugs, and comparative cost effectiveness. This holds true for our study also since the percentage of drugs prescribed from essential drug list was 98.08% which is higher value when compared to the study mentioned above.

In our study, Percentage of drugs prescribed by generic names was 60.52% which was found to be higher when compared to a study done by Nagabushan et al (52.9%)¹⁷, but was higher when compared to other studies done by Ghosh et al (04.37%)¹⁸ and Afroz et al (11.43%)¹⁶. The physician should concentrate on prescribing drugs with their generic names to the maximum in order to minimize the cost-burden on the patients.

Injections contributed around 23.37% among the total drugs prescribed which is lower when compared to previous studies done by Kaur S et al (75.17%)¹⁹ and Nagabushan H et al (100%)¹⁷. However in another study done in patients with ACS, the number of injectables prescribed was nil (0%) during the follow-up visits. This shows that the need for injections is very high during the emergency or acute management of ACS than during the follow-up visits. However, in our study the physicians have tried to minimize the number of injectables even during their hospital stay probably to avoid complications and to decrease the cost burden.

The percentage of encounters with antibiotics prescribed was found to be 13.86% which was less when compared to study done by Chandana et al (25%)²⁰ and done by Sri Chandana M et al (19.5%)²¹. The most common group of antibiotic prescribed was penicillin antibiotics which were selected according to the hospital antibiotic policy. The use of appropriate antibiotics in order to treat associated infection is justifiable. In our study antibiotic use is less compared to other study. Indiscriminate and inadequate use of antibiotic can lead to resistance. In our study there is less antibiotic use only when it is needed it is prescribed. Monitoring of antimicrobial use and knowledge of prescription habits are some of the strategies recommended to contain resistance to antimicrobials in hospitalized patients. In our study most patients had myocardial infarction and only 36 had of unstable angina. We found that out of 101 patients 86 (85.14%) were undergone Percutaneous Coronary Intervention. This is comparable to other studies which shows increasing trends of PCI in Acute coronary syndrome done by Nagamalesh UM et al²² PCI was offered to 81% ($n = 51$) of patients with ACS. Early reperfusion are key to management of patients presenting with STEMI. If facilities are available, primary percutaneous coronary intervention (angioplasty with stenting) is treatment of choice for patients with STEMI. In acute coronary syndromes there is drift towards early invasive treatment and this is reflected in marked increase in cardiac care (catheterization laboratories and cardiac surgery centers) facilities throughout India.

In our present study, Pre-discharge echocardiogram showed preserved LV function in 90.09% ($n=91$) reflecting timely institution of treatment for ACS, thus avoiding significant myocardial damage. In the remainder 07.92% ($n=08$) had mild LV dysfunction and only 01.98% ($n=02$) had moderate dysfunction. None of them had severe ventricular dysfunction. This is comparable to other study which was done by Nagamalesh UM et al²² Majority of the patients had preserved LV function 87.3% ($n = 55$) at discharge. Nearly 9.5% ($n = 6$) had mild LV dysfunction and 3.2% ($n =2$) had moderate LV dysfunction but none of them had severe LV dysfunction.

CONCLUSION

Coronary artery disease is the Impedance or blockage of one or more arteries that supply blood to the heart, usually due to atherosclerosis hardening of the arteries. Pharmacotherapy is the mainstay of management of coronary artery disease. Acute coronary syndrome had become an emerging pandemic among Indian population. Dyslipidemia, hypertension, Diabetes mellitus became the three main risk factors identified in our study participants. Although our study shows results on small number of patients which is the limitation of our study, it points out towards trends in prescribing patterns in Acute coronary syndrome. The present study provides valuable insight about the overall pattern of drugs used in ACS. Further I conclude that our study is in compliance with ACC / AHA guidelines revealing that the drug therapy given for the patients is in consistency and observes the scope and importance of having a clinical pharmacist to monitor and intervene the drug usage and prescribing patterns. Extensive patient education, early assessment and aggressive treatment by multi-disciplinary team represent the best approach to the management of high risk patients with Acute coronary syndrome. The over-all prescription patterns involved in our study is satisfactory. The less number of injectable prescribed in our study is appreciable imposing relatively less cost burden on patients.

FUTURE SCOPE

Clinical Pharmacists reviewing the practices periodically by pharmaco economic studies on prescribing patterns helps to analyze the cost and reduce the burden on the patient and there by improves quality of life in patients with Acute Coronary Syndrome.

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ABBREVIATIONS

ACS – Acute Coronary Syndrome,
 CCU – Coronary Care Unit,
 PCI – Percutaneous coronary intervention,
 LV dysfunction – Left Ventricular dysfunction,
 ACC – American College of Cardiology,
 AHA – American Heart Association,
 STEMI – ST segment Elevated Myocardial Infarction,
 NSTEMI – Non ST segment Elevated Myocardial Infarction.
 UA – Unstable Angina.

Conflict of Interest:

The authors declare no conflict of interest in preparing this article.

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