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# ANALYSIS OF ASSOCIATED RISK FACTORS AND PRESCRIBING PATTERN IN PATIENTS DIAGNOSED WITH ACUTE CORONARY SYNDROME

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## ABSTRACT

**Background**: Cardiovascular diseases are the leading cause of mortality and morbidity in India because of the rapid urbanization and economic growth, so timely recognition of risk factors and proper treatment is necessary. This study evaluates the risk factors and determines the treatment pattern in the acute coronary syndrome patients. **Methodology:** The prospective observational study was conducted in Vijaya hospital for 6 months period from April 2018 to September 2018 in patients who were diagnosed with acute coronary syndrome. Demographic details, co-morbities, clinical, laboratory findings as well as the prescription details of the patients was analyzed to find out the various risk factors and the prescription pattern among ACS patients. Patient risk stratification was done by using GRACE Score. To find out the association between the risk factors with gender and age, Chi-square test was done and $p<0.05$ was considered statistically significant. **Results:** A total of 160 patients were enrolled in the study. The most common risk factor was male gender and co morbid diseases such as hypertension and diabetes. Statistical significance was observed, when risk factor were compared with age and gender. Antiplatelets and Statins were the most prescribed drugs. Risk stratification was done using GRACE Score, in which STEMI patients had high risk of adverse outcomes. **Conclusion:** In ACS patients, male gender was the predominant risk factor. STEMI patients had high risk of hospital mortality. Antiplatelets and Statins were the most prescribed drugs among ACS patients.

**KEYWORDS:** Acute Coronary Syndrome, GRACE Score, Risk Stratification.

## INTRODUCTION

India has the highest burden of ACS in the world.[1] Acute coronary syndrome is a term used to describe three types of coronary artery disease that are associated with sudden rupture of plaque inside the coronary artery:

- Unstable Angina
- Non-ST segment elevation myocardial infarction or heart attack (NSTEMI)
- ST-segment elevation myocardial infarction or heart attack (STEMI)

CREATE registry, the largest data from Indian patients with Acute Coronary Syndrome (ACS), has shown that the pattern of ACS among Indians is much different from that of Western populations.[2]

The examination of a patient presenting with ACS begins with stratification for the risk of death and reinfarction. TIMI (Thrombolysis in Myocardial Infarction) for NSTE and GRACE (Global Registry of Acute Coronary Events) are the risk scores.

The Global Registry of Acute Coronary Events (GRACE) risk scores (RS) are the preferred scoring system is used for the risk stratification.[3]

Cardiovascular disease burden is increasing in Indian origin due to rapid urbanisation. Urbanization is characterized by decrease in physical activity, increase in the intake of energy dense foods, increased level of psychosocial stress and all of these promote to the development of hyperglycaemias, hypertension, and Dyslipidaemia. All these risk factors are leading to ACS.

Pharmacological therapy in ACS includes Fibrinolytics, Nitrates, Antiplatelets, Anticoagulants, Beta-blockers, Angiotensin converting Receptor Inhibitors (ACEI), Angiotensin receptor blocker (ARB), Statins, Calcium Channel Blockers, Aldosterone antagonist. Nonpharmacological therapy includes Angioplasty and stenting (PCI), Coronary bypass surgery.

Objectives of the present study is to identify the cardiovascular risk factors associated with patients who are hospitalized for Acute Coronary Syndrome and to look for the number of risk factors present in each patient, to identify and predict patients at high risk or likely to be

at high risk for short and long term adverse outcomes and to analyse the current trend of prescribing pattern of drugs used in the management of ACS.

## MATERIALS AND METHODS

A Prospective Observational Study was conducted in a 750 bedded multispecialty hospital located at Vadapalani, Chennai. 160 ACS patients were included in the study based on the inclusion and exclusion criteria. Ethical approval was obtained from Vijaya Hospital, Chennai prior to the study.

### Inclusion Criteria

- Age: Above 18 years
- Gender: Both male and female
- ACS patients diagnosed by presence of any of the below criteria according to American Heart Association(AHA) guidelines

1. Symptoms of ACS-presence of chest, epigastric, neck jaw or arm pain
2. ECG: Presence of ST changes
3. Raised cardiac biomarkers (at least one positive biomarker)
4. ECHO: Presence of Regional Wall Motion Abnormality (RWMA)

### Exclusion Criteria

- Patients less than 18 years of age
- Outpatients
- Pregnant and lactating women

### Data Analysis and Statistical Analysis

Risk stratification was categorized into low risk, moderate risk and high risk was done by using GRACE Score. Various risk factors associated with ACS patients and utilization of different classes of drugs as well as individual drugs was analysed and presented as percentages.

The statistical analysis was done by using Microsoft Excel and statistical software STATA 11.0. Continuous variables were represented as ‘Mean (SD), and categorical variables was represented as ‘Frequency (percentage)’. Chi-square was done to assess the difference in categorical data. The p value of $< 0.05$ was considered as significant.

## RESULTS

A total number of 160 ACS patients based on the sample size were included in study based on the inclusion and exclusion criteria. The demographic details, clinical data and prescription details were collected from the patients for the study.

160 ACS patients taken into the study, 125(78.13%) were males and females 35(21.88%). The male were predominant over female population. The mean age of the population was 58.8±13.60 years (56-70 years), where the maximum number 60(37.50%) of patients were in the age group of 56-70 years followed by 54(33.75%) in the age group of 40-55 years and least number of patients 13(8.13%) were in the age group of less than 40 years.

The patients having normal BMI 72(45%) were more predominant than overweight 63(39%) and obese patients 19(12%).

During the conduction of the study we found that patients diagnosed with ACS were majorly from urban residence (75%). 23(14.38%) patients have a positive family history of CAD.

### Smoking Habits

Smoking is said to be one of the major risk factors for developing Coronary artery syndrome. In this study population about 53% (85) patients were smokers. Giving justification for the above.

### Alcohol Habits

Out of 160 patients, non-alcoholics 95(59%) were more affected with ACS than alcoholics 65(41%).

### Distribution of ACS Patients

Patients of Acute Coronary Syndrome are generally classified into STEMI, NSTEMI, and patients diagnosed with Unstable Angina. In our study population greater number of patients 75(47%) had STEMI (ST segment elevated Myocardial Infarction) followed by 50(31%) had NSTEMI (non ST segment elevated Myocardial Infarction) and 35(22%) had UA (Unstable Angina).

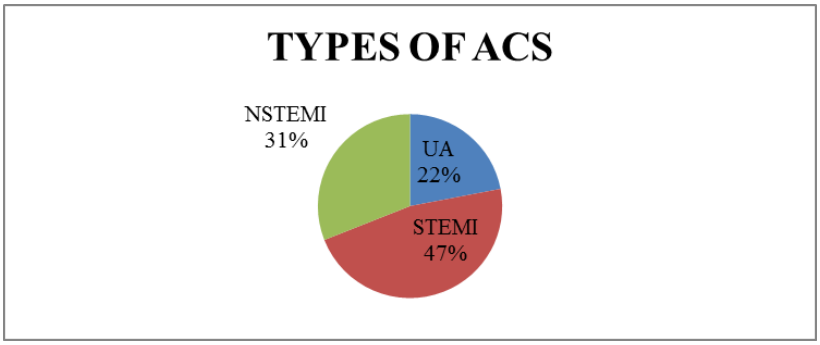


**Figure 1: Types of ACS.**

**Risk Factors in Acs Patients**

Risk factors like male gender was predominant 125(78.13%), followed by hypertension 103 (64.8%), diabetes mellitus 97 (60.0%), smoking 85(53%), alcohol intake 65 (41%), family history 23 (14.38%), obesity 19 (12%), dyslipidaemia 15 (9.8%), hypothyroidism 11 (6.88%), asthma/COPD 10 (6.25%).

**Table 1: Risk Factors in ACS Patients.**

| Risk Factors | No of Patients | Percentage (%) |
|---|---|---|
| Male Gender | 125 | 78.13 |
| Hypertension | 103 | 64.8 |
| Diabetes Mellitus | 97 | 60.6 |
| Smoking | 85 | 53 |
| Alcohol Intake | 65 | 41 |
| Family History | 23 | 14.38 |
| Obesity | 19 | 12 |
| Dyslipidaemia | 15 | 9.80 |
| Hypothyroidism | 11 | 6.88 |
| Asthma/COPD | 10 | 6.25 |

**Prescription Pattern in Acs Patients**

The most prescribed drug was antiplatelets to patient 160(100%) followed by statins to patients 160(100%), anticoagulants 154(96.5%), the preceding drugs were antianginals 147(91.87%), diuretics 126(78.75%) and beta-blockers 78(48.75%).

**Table 2: Prescription Pattern in ACS Patients.**

| Drug Class | No of Patients(n=160) | Percentage (%) |
|---|---|---|
| Antiplatelets | 160 | 100 |
| Statins | 160 | 100 |
| Anticoagulants | 154 | 96.5 |
| Antianginals | 147 | 91.87 |
| Diuretics | 126 | 78.75 |
| Beta-Blockers | 78 | 48.75 |

**Antiplatelets prescribed**

Among antiplatelet monotherapy, aspirin 69(56.09%) was the most prescribed drug followed by Aspirin+ Clopidogrel 37(23.12%), Clopidogrel 30(18.75%), Prasugrel 11(6.87%) and Tirofiban 9(5.62%) and Ticagrelor 4(2.5%).

**Table 3: Antiplatelets prescribed.**

| Drug Name | No of Patients (n=160) | Percentage (%) |
|---|---|---|
| Aspirin | 69 | 56.09 |
| Aspirin+ Clopidogrel | 37 | 23.12 |
| Clopidogrel | 30 | 18.75 |
| Prasugrel | 11 | 6.87 |
| Tirofiban | 9 | 5.62 |
| Ticagrelor | 4 | 2.5 |

Atorvastatin 131(81.8% was the most prescribed lipid lowering agent followed by Rosuvastatin 29(18%). Heparin 100(62.5%) was the most prescribed anticoagulant followed enoxaparin 52(33%) and warfarin (1%). Nitrates were most prescribed antianginal followed by trimetazidine, calcium channel blockers, amiodarone, ivabradine, nicorandil and ranolazine.

Furosemide 23(38.3%) was the most prescribed diuretic and torsemide 7(11.6%) was the least prescribed. The most prescribed beta-blocker was Metoprolol followed by atenolol, nebivolol and bisoprolol.

**Risk Stratification by Grace Score**

Out of 75 STEMI patients 30 had low risk, 44 had medium risk and 1 had high risk. Among 50 NSTEMI patients 35 had low risk and 15 had medium risk and remaining 35 UA patients 25 had low risk and 10 had medium risk.

**Table 4: Risk Stratification by GRACE Score.**

| Grace Score | Low | Medium | High |
|---|---|---|---|
| STEMI | 30 | 44 | 1 |
| NSTEMI | 35 | 15 | 0 |
| UA | 25 | 10 | 0 |

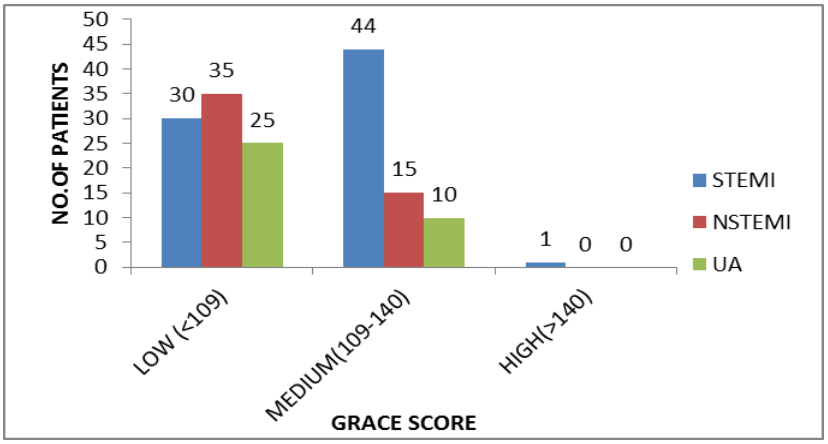


**Figure 2: Risk stratification by GRACE score.**

### Comparison of Age with Risk Factors

Our study showed a statistical significance between age and risk factors(smoking, alcohol and diabetes). Smoking was prevalent in the age group of 56-70 years than in other age groups; this difference was statistically significant($p<0.05$). Alcohol intake were significantly higher in the age group 40-55 years than other age groups ($p<0.05$). Diabetes was more prevalent in the age group of 56-70 years.

**Table 5: Comparison of age with risk factors.**

| Risk factors | Age | | | | | |
|---|---|---|---|---|---|---|
| | **Less than 40 (N=13)** | **40-55 (N-54)** | **56-70 (N=60)** | **71-85 (N=27)** | **More than 85 (N=6)** | **P-Value** |
| Smoking | 12(14.12%) | 37(43.53%) | 26(30.59%) | 8(9.41%) | 2(2.35%) | **<0.001*** |
| Alcohol | 11(16.92%) | 33(50.77%) | 20(30.77%) | 1(1.54%) | 0(0%) | **<0.001*** |
| Dyslipidaemia | 0(0%) | 7(12.96%) | 5(8.33%) | 3(11.11%) | 0(0%) | 0.727 |
| HTN | 7(53.85%) | 30(55.56%) | 40(66.67%) | 20(74.07%) | 6(100%) | 0.135 |
| DM | 7(53.85%) | 26(48.15%) | 43(71.67%) | 19(70.37%) | 2(33.33 %) | **<0.044*** |
| Hypothyroidism | 0(0%) | 2(3.70%) | 6(10.00%) | 2(7.41%) | 1(16.67%) | 0.389 |
| Asthma/COPD | 1(7.69%) | 1(1.85%) | 3(5.00%) | 4(14.81%) | 1(16.67%) | 0.166 |
| Family History | 2(15.38%) | 7(12.96%) | 10(16.67%) | 4(14.81%) | 0(0%) | 0.850 |
| Obesity | 5(78.94%) | 6(31.57%) | 4(21.05%) | 2(10.52%) | 1(5.26%) | 0.726 |

### Comparison of Gender with Risk Factors

There is a statistical association between gender and risk factors. Smoking was more prevalent in male ($p<0.05$). In addition there exits a statistical significance between gender and alcohol intake.

**Table 6: Comparison of gender with risk factors.**

| Risk Factors | Male | Female | P-Value |
|---|---|---|---|
| Smoking | 85(100%) | 0(0 %) | **<0.001*** |
| Alcohol | 65(100%) | 0(0%) | **<0.001*** |
| Dyslipidaemia | 12(80%) | 3(20.00%) | 0.577 |
| HTN | 80(77.67%) | 23(22.33%) | 0.852 |
| DM | 77(79.38%) | 20(20.62%) | 0.633 |
| Hypothyroidism | 5(54.55%) | 6(45.45%) | 0.480 |
| Asthma/COPD | 9(90.00%) | 1(10.00%) | 0.348 |
| Family History | 17(73.91%) | 6(26.09%) | 0.597 |
| Obesity | 15(78.95%) | 4(21.05%) | 0.926 |

## DISCUSSION

Acute Coronary Syndrome is a common manifestation of Cardio vascular disease. Cardiovascular risk factors for acute coronary syndrome (ACS) are on the rise in people of Indian origin.[4] Therefore, timely recognition of risk factors and appropriate management is of utter importance to prevent coronary heart disease.

In the present study, out of 160 ACS patients, 125(78.13%) were male patients and 35(21.87%) were female patients. The mean age of patients who presented with ACS was 58.8±13.60 years.

In the present study, ACS was more common in males (78.1%) and age group between 56- 70 years. This finding is consistent with the study conducted by Saumya Gupta et al, which showed 85% of patients were males.[5] Male predominance also correlates with the observation made by PS Singh et al.[6] Our study also showed a higher proportion of STEMI cases among patients with ACS as observed in the CREATE registry.[7]

Nearly 1 of 5 deaths of heart disease is directly related to cigarette smoking. Nicotine raises blood pressure, increases heart rate, and many more that lead to the development of acute coronary syndrome. In our study we have resulted that about 85(53%) patients were smokers, giving a justification to this evidence.

In our study smoking was more prevalent in male patients than in female patients. This is similar to the findings in the study conducted by Ahmed.A.Reda et al, in which smoking was more prevalent in male patients in all types of ACS.[8]

Contradicting the fact that obesity is itself an independent risk factor for ACS in both men and women. Our study had only 12% of obese patients. Family history of CAD has an

increased risk of premature coronary events. Present study showed that only 14.23% of patients had history of premature CAD.

The most common risk factor in our society was male gender, which correlates with a study conducted by Hochman et al.[9] Male preponderance and smoking being the major risk factor as seen in a study conducted by Yusuf S et al.[10]

The presence of co-morbid diseases such as hypertension, diabetes mellitus, dyslipidaemia, hypothyroidism, and asthma/COPD is strongly connected with the long shelf life of patients diagnosed with acute coronary syndrome.

Our study showed that hypertension was the more predominant co-morbid condition (64%) next to diabetes, dyslipidaemia, hypothyroidism and asthma/COPD. This was similar to a study conducted by Battu Rakesh et al, which concluded that hypertension and diabetes were the most common risk factors associated with cardiovascular system.[11]

Our study showed a statistical significance between age and risk factors as well as gender and risk factors. Smoking was more prevalent in the age group of 56-70 years (p-value<0.05). Alcohol was more prevalent in the age group of 40-55 years (p-value<0.05). Smoking and alcohol was more prevalent in the male gender (p-value<0.05).

Our study included the analysis of Antiplatelets, Anticoagulants, Antianginals, Beta-blockers, Diuretics, and Statins. In the present study, antiplatelets and statins were given to all the 160 patients' i.e. the drug prescription rates of antiplatelets and statins were 100%, anticoagulants in 96.5%, antianginals in 91.87%, diuretics in 78.75% and beta-blockers in 48.75% of the study population.

Aspirin 69(56.09%) was the most prescribed antiplatelet drug in the study which is similar to a study conducted by Pranay Wal et al.[12] Atorvastatin 131 (81.8%) is the most commonly prescribed statin.

In a study conducted by Shruthi Dawalji et al, drug prescribing for unfractioned heparin was more than low molecular weight heparin.[13] The present study showed a similar result where drug prescribing rate for unfractioned heparin was found to be 62.5% and low molecular weight heparin, enoxaparin was mostly prescribed.

Nitrates constitute about 73% of antianginals prescribed. This was similar to a study conducted by Blessy Racheal Thomas et al.[14] The prescribing rate of diuretics was 78.75% among this Furosemide (38.%) was the most prescribed one. Among the beta-blockers, Metoprolol (42.7%) was the most prescribed beta-blocker.

In the present study, risk stratification was done by GRACE score. Out of 75 STEMI patients 30 had low GS, 44 had medium GS and 1 had high GS. Among 50 NSTEMI patients, 35 had low GS and 15 had medium GS. Out of 35 UA patients, 25 had low GS and 10 had medium GS.

## CONCLUSION

In the present study male gender was the predominant risk factor followed by hypertension, diabetes mellitus, smoking, alcohol intake, family history, obesity, dyslipidaemia, hypothyroidism and asthma/COPD. Risk stratification was done in STEMI, NSTEMI and in UA patients. There was higher in-hospital mortality risk in STEMI compared with NSTEMI and UA. Antiplatelets followed by statins were the most prescribed drugs in ACS patients.

Proper recognition of risk factors and promotion of prevention strategies such as smoking/tobacco cessation, physical activity and healthy dietary habits, there by reduces the risk factors. Better screening techniques for hypertension, hypocholesteraemia and diabetes mellitus prevent the incidence of chronic heart diseases. The knowledge of prescribing pattern can lead us towards the rational use of drugs and also to contribute steps towards the improvement of both the patient's safety as well as medication quality.

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