# Clinical Profile of Acute Coronary Syndrome in Females in a Tertiary Care Centre

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**Abstract:** *In ACS patients, gender-related differences in symptomatology, time of first presentation and outcomes have been observed. Hence, a clinical profile of female individuals presenting with acute coronary syndrome assumes clinical significance. All female patients admitted and diagnosed with Acute Coronary Syndrome during the study period were included in the study depending on the inclusion criteria. Statistical analysis was done by SPSS. Respective graphs and tables were made to define the distribution of age, type of ACS, distribution of various risk factors and BMI among the study population. In this study, majority of patients belonged to age group 51-70 years (62.7 %)., it was found that majority females had STEMI (46.1%).60.8 % patients had hypertension, 59.8% patients had dyslipidemia, 58.8 % patients had diabetes, 28.4% were alcoholics, 51 % were smokers, 67.6 % were post-menopausal, 52.9 % had hypothyroidism, 43.1 % had a previous history of ACS and 14.7% had a history of previous cardiac intervention. Majority females (49.0 %) had BMI more than 30 (Obese).68.6 % patients presented with typical anginal chest pain. Compared to male counterparts, huge section of the female population goes unrecognised, remains undiagnosed until the occurrence of a major cardiac event including death.*

**Keywords:** Acute Coronary Syndrome, Females, Clinical profile, hypertension, Diabetes, Hypothyroid, Post menopause

## 1. Introduction

Cardiovascular diseases are one of the most common causes of mortality worldwide. It is predicted that more than half of the worldwide cardiovascular disease risk burden will be borne by the Indian subcontinent in the next decade (1) . In ACS patients, gender-related differences in symptomatology, time of first presentation and outcomes have been observed in previous studies. (2) Besides observed disparities in baseline characteristics, atypical symptoms like back pain, nausea and shortness of breath as a presentation of ACS were more commonly found to be associated with female gender. (3) Given the prognostic significance of rapid identification of patients with ACS and the need for timely intervention, patient triage at the emergency department is of paramount importance, and is mainly based on biochemical parameters, electrocardiography (ECG) changes and biomarker profiles. (4)

## 2. Materials and Methods

**Study Type:** This study is a hospital-based observational study

**Period of Study:** From 1st July 2021 to 30th June 2022

**Study Populations:** All female patients diagnosed with Acute Coronary Syndrome during the study period.

**Study Location:** Gauhati Medical College and Hospital.

**Sample Size**
As per standard statistical formula
$[Z^2 p (1 - p)] / c^2$
where Z = Z score

p = percentage picking a choice, expressed in decimal
c = Confidence interval
Sample size came out to be **102**

**Source of Data**
Patients admitted in inpatient section in the Department of Medicine and Department of Cardiology, Gauhati Medical College and Hospital.

**Method of Collection of Data**
All the female patients suspected to have Acute Coronary Syndrome attending the emergency department or outpatient department in the study period were intended to be included in the study irrespective of severity and duration. Informed signed consent was obtained in all cases prior to inclusion in the study. A detailed history and physical examination of the cases was carried out as per predesigned proforma. BMI (Body Mass Index) was calculated for each patient depending on the height and weight of the patient. The following investigations were performed on the patient as a part of hospital usual procedure.

- *Complete blood count*: This was mainly done to rule out any acute infection or inflammation and to calculate the differential and absolute monocyte count of the patient as required by our study.
- *Lipid Profile:* This rules in dyslipidemia as a risk factor and also gives values of HDL cholesterol as needed for calculating MHR.
- *Renal function tests*
- *Random blood sugar*: This helped both a screening test for diabetes for patients who were not a known diabetic and for those who were known diabetics this helped to assess their diabetic status.
- *Cardiac Biomarkers*-CK-MB, TropT, hsTropI: This was used to assess the type of ACS and serial measurements of biomarkers were done to look for the rise and fall

which is considered to more specific for ACS.
- *Serum electrolytes*
- *ECG:* Patterns of ECG were analysed in every ACS patient.
- *Chest X Ray* was done as a routine and also to look for signs of heart failure.
- *2D ECHO* was done as a routine for all ACS patients to assess the LV function, look for complications and also to enhance the confirmation of ACS. However, we have not included the echocardiography findings in describing the profile of ACS patients in this study.

**Inclusion Criteria**
- Women with Age >18 years
- ST elevation MI (STEMI)
- Non-ST elevation MI (NSTEMI)
- Unstable An

**Exclusion Criteria**
- Cerebrovascular disease
- Renal or hepatic disease
- Acute or chronic infection and/or inflammation, malnutrition,
- Hematologic diseases, thrombocytopenia,
- Symptomatic peripheral arterial disease
- Autoimmune diseases
- Malignancies,
- Pregnancy
- Chronic obstructive pulmonary disease.
- Immunosuppressive status
- Recent operation (<3 months), and trauma.

**Statistical Method**
Data was entered in Microsoft excel and a master chart was prepared with the patient particulars, their clinical profile and investigation findings. Statistical analysis was done by SPSS (Statistical Package for Social Science) software (by IBM company). Respective graphs and tables were made to define the distribution of age, type of ACS, distribution of various risk factors and BMI among the study population.

## 3. Results and Observation

**Table 1:** Age Distribution

| Age | No. of Patients | Percentage |
|---|---|---|
| 31-50 Years | 25 | 24.5% |
| 51-70 Years | 64 | 62.7% |
| 71-80 Years | 12 | 11.8% |
| 81-100 Years | 1 | 1.0% |

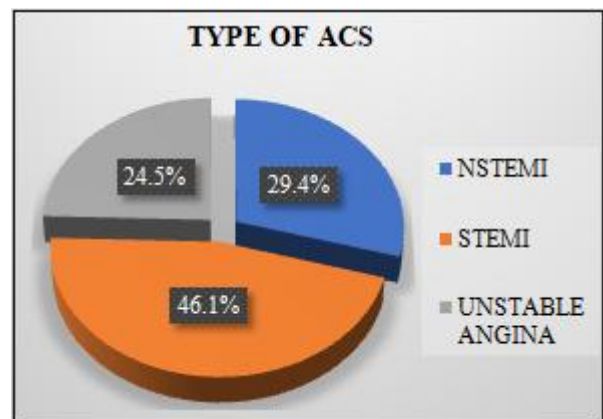In this study, majority of patients belonged to age group 51-70 years (62.7 %).
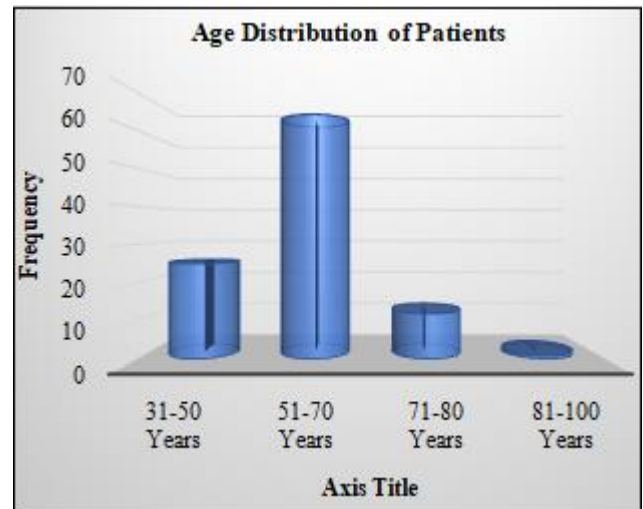


**Figure 1:** Age Distribution

In this study, it was found that majority females had STEMI 46.1 %) followed by NSTEMI (29.1 %) followed by UNSTABLE ANGINA (24.5 %).

**Table 2:** Distribution of the Types of Acute Coronary Syndrome

| Type of ACS | No. of Patients | Percentage |
|---|---|---|
| NSTEMI | 30 | 29.4% |
| STEMI | 47 | 46.1% |
| UNSTABLE ANGINA | 25 | 24.5% |



**Figure 2:** Distribution of the Types of Acute Coronary Syndrome

In this study, 60.8 % patients had hypertension, 59.8 % patients had dyslipidemia, 58.8 % patients had diabetes, 28.4% were alcoholics, 51 % were smokers, 67.6 % were post-menopausal, 52.9 % had hypothyroidism, 43.1 % had a previous history of ACS and 14.7% had a history of previous cardiac intervention.

**Table 3:** Profile of Risk Factors

| Risk Factors | Percentage |
|---|---|
| Hypertension | 60.8% |
| Dyslipidemia | 59.8 % |
| Diabetes | 58.8% |
| Alcohol | 28.4% |
| Smoker | 51.0% |
| Post Menopause | 67.6% |
| Hypothyroidism | 52.9% |
| Previous Episode | 43.1% |
| Previous Cardiac Intervention | 14.7% |
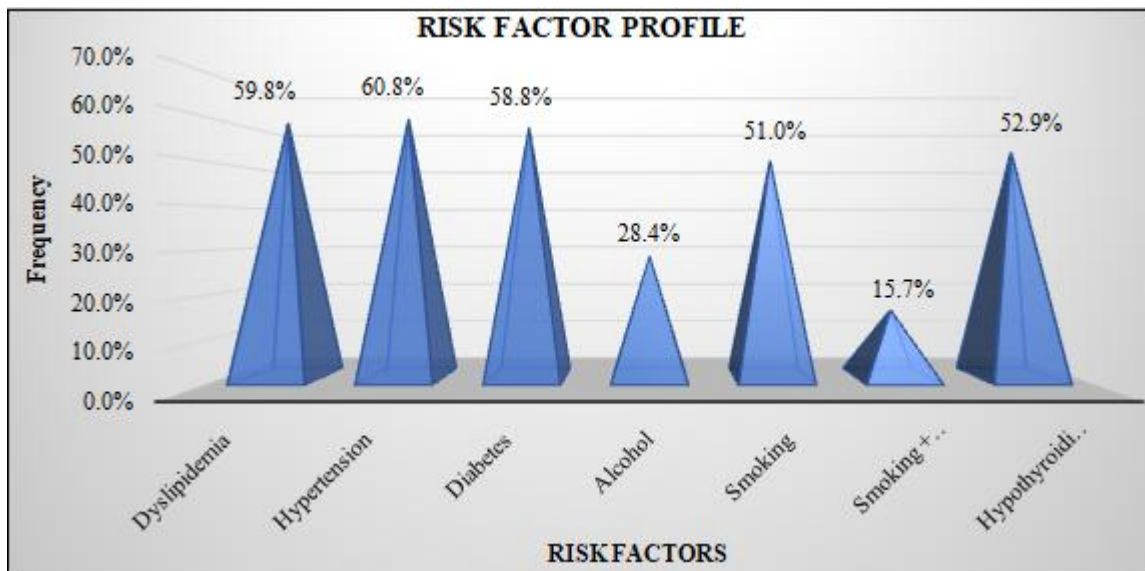
**Figure 3:** Profile of Risk Factors

**Table 4:** Profile of Body Mass Index

| BMI | No of patients | Percentage |
|---|---|---|
| 18.5-22.9 (Underweight) | 7 | 6.9% |
| 23.0-24.9 (Normal) | 27 | 26.5% |
| 25.0-29.9 (Overweight) | 18 | 17.6% |
| >=30 (Obese) | 50 | 49.0% |

In this study, majority females (49.0 %) had BMI more than 30 (Obese), 26.5 % had normal weight, 17.6 % were overweight and 6.9 % were underweight
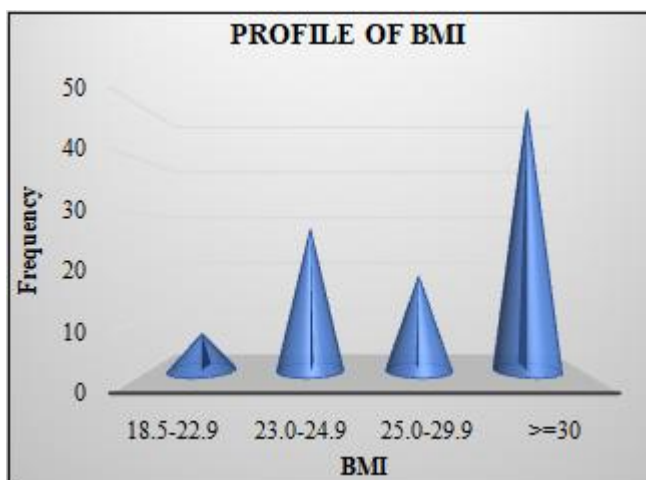


**Figure 4:** Profile of Body Mass Index

**Table 5:** Presenting Symptoms

| Symptoms | Frequency | Percentage |
|---|---|---|
| TYPICAL CHEST PAIN | 70 | 68.60% |
| ATYPICAL CHEST PAIN | 10 | 9.80% |
| NAUSEA | 29 | 28.40% |
| DIAPHORESIS | 26 | 25.50% |
| FATIGUE | 32 | 31.40% |
| VOMITING | 29 | 28.40% |

In this study, 68.6 % patients presented with typical anginal chest pain, 9.80 % presented with atypical chest pain, 28, 4 % presented with nausea, 25.5 % presented with diaphoresis, 31.4 % presented with fatigue and 28.4 % presented with vomiting alone or in combination with each other.
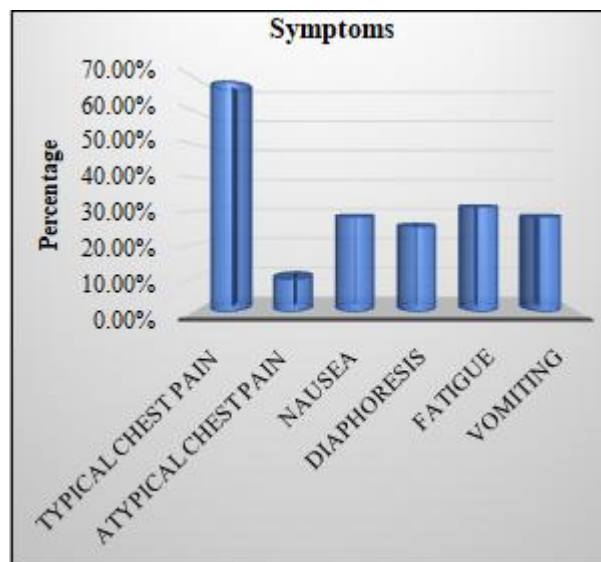


**Figure 5:** Presenting Symptoms

**Table 6:** Profile of ECG Changes

| ECG | No of Patients | Percentage |
|---|---|---|
| Normal | 2 | 2.0% |
| Hyperacute T Waves | 4 | 3.9% |
| NON-Specific Changes | 19 | 18.6% |
| Q WAVES | 3 | 2.9% |
| ST Depression | 2 | 2.0% |
| ST Depression, T Wave Inversion | 21 | 20.6% |
| ST Depression, T Wave Inversion, Q Waves | 1 | 1.0% |
| ST Depression, T Wave Inversion, SVT | 2 | 2.0% |
| ST Elevation | 41 | 40.2% |
| ST Elevation, Q Waves | 4 | 3.9% |
| ST Elevation, Q Waves, SVT | 1 | 1.0% |
| SVT | 2 | 2.0% |

In this study, majority females (40.2%) had ST elevation, 20.6 % had ST depression with T wave inversion, 18.6 % had nonspecific changes and 3.9 % females had hyperacute T waves.
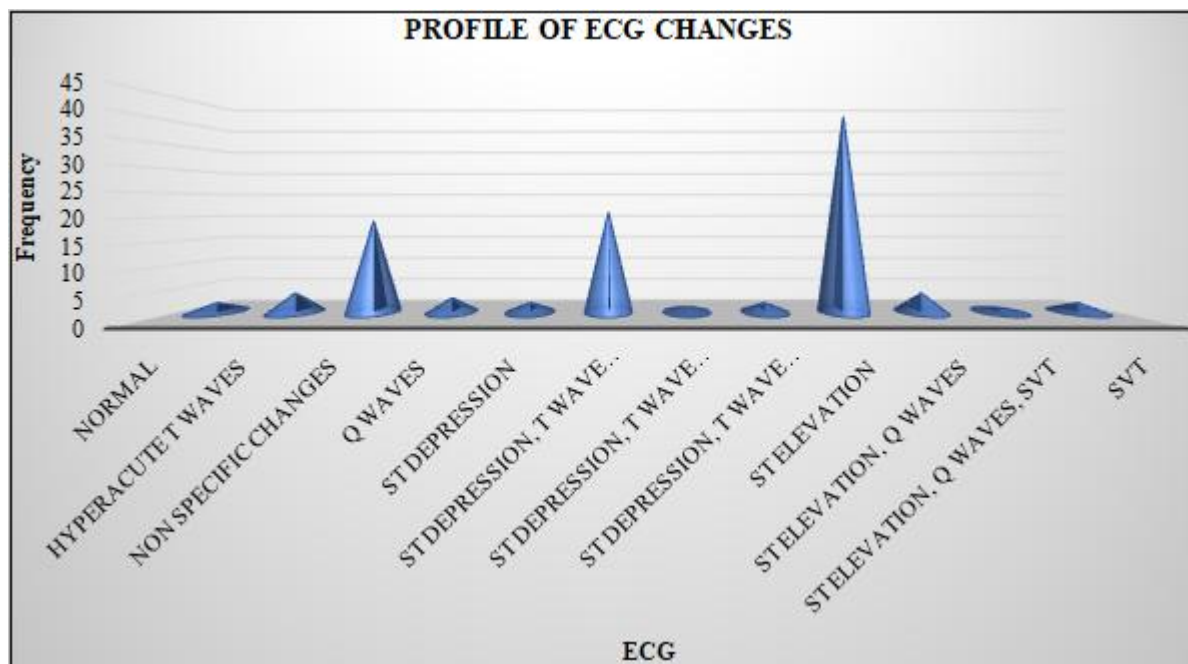
**Figure 6:** Profile of ECG Changes

**Table 7:** Level of Cardiac Troponins

| Troponin Level | No of patients | Percentage |
|---|---|---|
| < Normal Limit | 10 | 9.8% |
| 1-3x Normal Limit | 19 | 18.6% |
| >3 x Normal Limit | 73 | 71.6% |

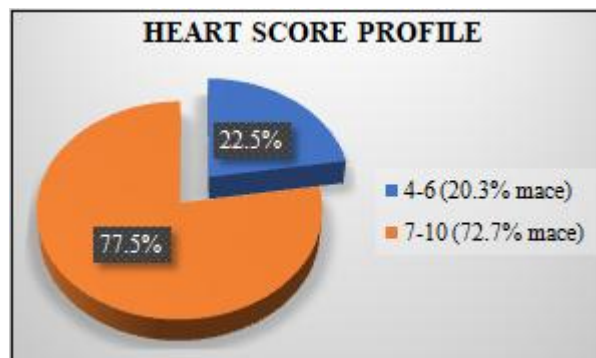In this study, majority females (71.6 %) had cardiac troponin levels more than 3 times the upper limit of normal.
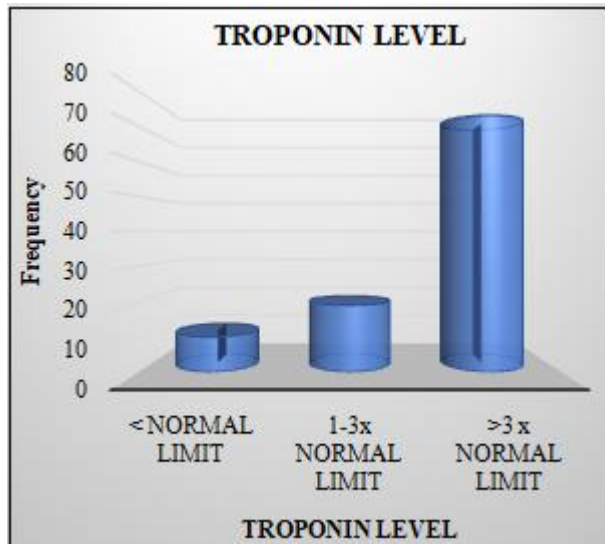


**Figure 7:** Level of Cardiac Troponins

**Table 8:** Heart Score Profile

| Heart Score | No of patients | Percentage |
|---|---|---|
| 0-3 (2.5 % mace) | 0 | 0 % |
| 4-6 (20.3% mace) | 23 | 22.5% |
| 7-10 (72.7% mace) | 79 | 77.5% |

In this study, majority females (77.5 %) have Heart score between more than or equal to 7, 22.5 % had score between 4-6 and none had score less than 4. Mean Heart score was 7.78.



**Figure 8:** Heart Score Profile

**Table 9:** TIMI Score For Ua/Nstemi Profile

| TIMI_SCORE FOR UA/NSTEMI | Frequency | Percentage |
|---|---|---|
| 0/1-4.7% mace risk | 14 | 25.4 % |
| 2-8.3% mace risk | 12 | 21.8 % |
| 3-13.2% mace risk | 22 | 40.0 % |
| 4-19.9% mace risk | 7 | 12.7 % |
| 5-26.2% mace risk | 7 | 12.7 % |
| 6/7-40.9% mace risk | 3 | 5.45 % |
| TOTAL | 55 | 100 % |

In this study, 40 % females had a TIMI score of 3, 25.4 % had a score of 1, 21.8 % a score of 2, 12.7 % a score of 4 and 5, and 3 % had the highest score of 6 or 7.
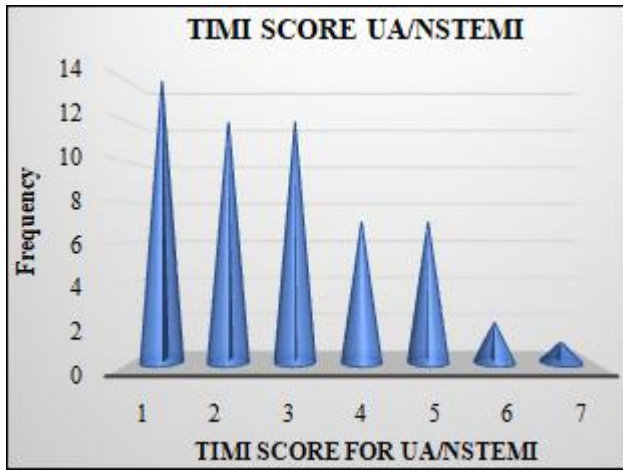
**Figure 9:** Timi Score for UA/NSTEMI Profile

**Table 10:** TIMI Score for Stemi Profile

| TIMI_SCORE FOR STEMI | Frequency | Percentage |
|---|---|---|
| 1 – 1.6 % 30-day mortality | 0 | 0 % |
| 2 – 2.2 % 30-day mortality | 0 | 0 % |
| 3 – 4.4 % 30-day mortality | 2 | 4, 2 % |
| 4 – 7.3 % 30-day mortality | 6 | 12.7 % |
| 5 – 12.4 % 30-day mortality | 5 | 10.6 % |
| 6 – 16.1 % 30-day mortality | 1 | 2.1 % |
| 7– 23.4 % 30-day mortality | 0 | 0 % |
| 8– 26.8 % 30-day mortality | 1 | 2.1 % |
| >8– 35.9 % 30-day mortality | 32 | 68 % |
| TOTAL | 47 | 100 % |

In this study, 68 % females had a TIMI score of >8, 12.6 % had a score of 4, 10.6 % a score of 5, 4.2 % a score of 2, 2.1 % had a score of 6 and 8.
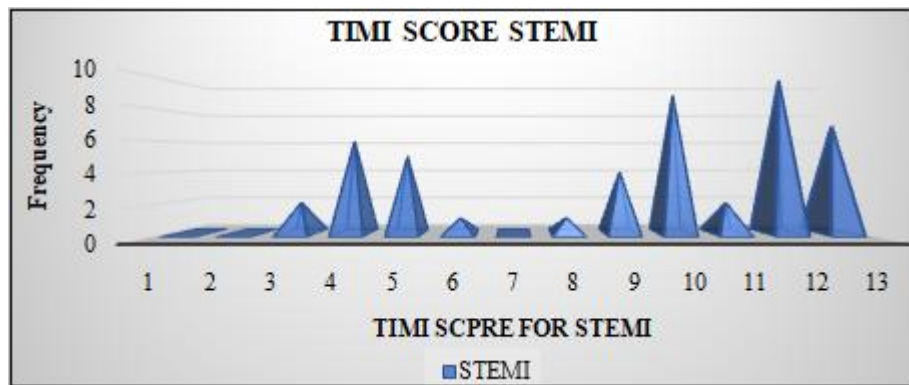

**Figure 10:** Timi Score for STEMI Profile

## 4. Discussion

Our study is an extensive study that analyses the clinical profile of female ACS patients

**Age Distribution**
In this study, majority of patients belonged to age group 51-70 years (62.7 %). In the study by Nanjappa et al., 2016, most patients belonged to the age group 61-70. (5) In another comparative study the mean age for male ACS was 53.28% and for female ACS was 60.23%. (6) This is in conjunction with the literature and our study that risk of ACS in females is highest in the 6th decade of their life.

**Type of ACS**
In this study, it was found that majority females had STEMI 46.1 %) followed by NSTEMI (29.1 %) followed by UNSTABLE ANGINA (24.5 %). In a similar study by Tummala et al., 2019 62 % females presented with STEMI, 32.7% females had NSTEMI and 27.2 % presented with Unstable angina which was similar to our study where majority patients presented with STEMI. (7) Thus, in almost every similar study the most common type of ACS observed was STEMI which can probably be due to its severity of initial presentation.

**Profile of Risk Factors**
In this study, 60.8 % patients had hypertension, 59.8% patients had dyslipidemia, 58.8 % patients had diabetes, 28.4% were alcoholics, 51 % were smokers, 67.6 % were post-menopausal, 52.9 % had hypothyroidism, 43.1 % had a previous history of ACS and 14.7% had a history of previous cardiac intervention. In a similar study by Dibril et al., 2019, 63.3 % were hypertensive, 54.1 % were diabetic, 6.1 % were smokers. (8) This was similar to our study where risk factor was dominated by hypertension followed by diabetes. But in another study by Sharma et al., 2019, 49.3% were smokers, 40.2% had hypertension, 37.96% had dyslipidemia and 37 % were diabetic. (6) Hence, in this study the risk factor profile was dominated by smoking. In another study by Nagamesh et al., 2018, 69.8% female ACS patients had dyslipidemia which was the highest prevalent risk factor in this study followed by diabetes which was present in 42.9 % females. (11) In our study, dyslipidemia was the 2nd most prevalent risk factor (59.8%) close to hypertension. (60.8%) Thus, in most studies the highest profiles of risk factors are held by hypertension, dyslipidemia and smoking.

**Distribution of Body Mass Index**
In this study, majority females (49.0 %) had BMI more than 30 (Obese), 26.5 % had normal weight, 17.6 % were overweight and 6.9 % were underweightIn the study of Djibril et al., 2019, 33% females had obesity. (8) In the study of Sharma et al., 2014, 29.64 % females were obese. (6) Hence, obesity is significantly prevalent in patients with ACS.

**Clinical Presentation**
In this study, 68.6 % patients presented with typical anginal chest pain, 9.80 % presented with atypical chest pain, 28, 4 % presented with nausea, 25.5 % presented with diaphoresis,

31.4 % presented with fatigue and 28.4 % presented with vomiting alone or in combination with each other. In the study by Nagamesh et al., 2018, the most common clinical presentation was chest pain (95.2%) followed by dyspnea (20.6 %). (11) Even in our study the most common clinical presentation remained chest pain. (68.6%) Hence, although atypical presentation was quite common in females, chest pain still remained the most common type of clinical presentation.

### Profile of ECG Changes

In this study, majority females (40.2%) had ST elevation, 20.6 % had ST depression with T wave inversion, 18.6 % had nonspecific changes and 3.9 % females had hyperacute T waves. In the study by Djibril et al., 2019, 54.1% ST segment elevation on ECG and 45.9% patients had ST depression with T inversion. (8) This was similar to our study where the most prevalent ECG change was ST elevation followed by ST depression. Hence, ST elevation was found to be the most common ECG finding considering STEMI to be the most common type of ACS.

### TIMI Score Profile

In this study, 40 % females had a TIMI score of 3, 25.4 % had a score of 1, 21.8 % a score of 2, 12.7 % a score of 4 and 5, and 3 % had the highest score of 6 or 7. But in the study by Stăli at al., 2015, 71% female ACS patients had TIMI score in the range 0-2, 22% had score in the range 3-5 and 7% had score in the range 6-7. (15) Whereas in our study maximum patients had TIMI score greater than 2. Thus, TIMI score prognostic score and varies depending on the severity of clinical presentation. Those presenting in the outpatient department are expected to have a score below 2 whereas those presenting in the emergency department requiring admission are expected to have a TIMI score above 3 as in our study.

## 5. Conclusion

Cardiovascular Diseases contribute to a significant degree of mortality and morbidity worldwide among which coronary artery disease takes a great toll on people considering its devastating consequences and frequent incidences of sudden cardiac deaths. While the pathophysiology in males is well understood, a wide section of pathophysiology still remains unexplored and unknown in female patients. Compared to male counterparts, huge section of the female population goes unrecognised, remains undiagnosed until the occurrence of a major cardiac event including death. Hence, more literature needs to be made available to understand the pattern of clinical profile of Acute coronary syndrome in females which includes their age profile, risk factor profile, symptom profile and severity profile.

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