Clinical Profile of Acute Coronary Syndrome in Young Adults

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ORIGINAL ARTICLE

ABSTRACT

Background and Objective: Acute coronary syndrome (ACS) is an umbrella term representing a common end result, acute myocardial ischemia: Including ST-segment elevation myocardial infarction (STEMI), non-ST-STEMI (NSTEMI), and unstable angina (UA). The present study was undertaken to observe and compare the clinical profile of ACS in male and female young adults.

Materials and Methods: The present cross-sectional study was conducted at cardiac ward and cardiac intensive care unit, Little Flower Hospital and Research Centre, Angamaly. 50 male and female participants admitted with ACS were recruited for the study after obtaining written informed consent by purposive sampling. Data were analyzed using SPSS 20.0. The statistical test used is regression analysis and Student's *t*-test.

Results: Female's age group is significantly different than males. Body mass index (BMI) is not significantly different in males and female participants. NSTEMI and UA incidence are significantly higher in females ($P < 0.001$). While significantly higher incidence rate of STEMI ACS was observed in males ($P < 0.001$). 48.65% of male patients had dyslipidemia (DLP), while only 38.46% of female patients had DLP. The incidence rate of DLP was significantly ($P = 0.0067$) higher in male patients. Significantly greater number of male patients presented symptoms of chest pain, while female patients presented with symptoms of chest pain or chest discomfort. The symptoms chest discomfort was significantly lower in male patients. While 7.69% of female patients presented with chest heaviness or abdominal pain, these symptoms were not observed among male patients. A symptom of sweating was prominently observed in male patients, while symptoms of retrosternal pain and tiredness were exclusive to male patients. A symptom of vomiting was equally reported by both male and female patients. Furthermore, the observation of multiple symptoms was significantly ($P < 0.01$) higher among male patients. As the r^2 value is positive, the correlation between the parameters, although very low its positive. Female's age group is significantly different than males. BMI is not significantly different in males and female participants. Both systolic and diastolic pressures were not significantly different in the participants. High-density lipoproteins, fasting blood sugar, low-density lipoproteins cholesterol is slightly higher in females; however, it is not statistically significant. Triglycerides and troponin I were lower in females than males. However, it is not statistically significant. Blood urea and serum creatinine were slightly lower in females than males; however, it is not statistically significant. No difference in uric acid levels was observed. Serum glutamic oxaloacetic transaminase and serum glutamic-pyruvic transaminase enzyme levels are lower in females when compared with males; however, it is not statistically significant. Sodium levels are slightly lower in females, and potassium levels are slightly higher in females when compared with males; however, it is not statistically significant.

Conclusion: The present study indicates NSTEMI and UA incidence was higher in females, and STEMI incidence was higher in males. We recommend further detailed multicenter study in this area with higher sample size to confirm the results and implement preventive measures for the benefit of the society in general.

KEY WORDS: Acute coronary syndrome, non-ST elevated myocardial infarction, ST-elevated myocardial infarction, risk factors, unstable angina.

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Introduction

Acute coronary syndrome (ACS) is an umbrella term representing a common end result, acute myocardial ischemia: Including ST-segment elevation myocardial infarction (STEMI), non-ST-STEMI (NSTEMI), and unstable angina (UA).[1] In simple terms, ACS is the situation where the blood supplied to the heart

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muscle is suddenly blocked. Cardiovascular diseases have become one of the major health problem reaching epidemic proportions. Previous studies have reported that there is a rising incidence of ACS in the young. The currently available evidence, young patients represent 0.4-19% of all ACS cases, depending on the cut-off age used.[2-5] A significant proportion of the burden of coronary heart disease is attributed to behavioral or lifestyle factors including poor diet, obesity, and tobacco use. Biomedical risk factors such as hypercholesterolemia, hypertension, obesity, and diabetes are also known to contribute to the development of the disease. The presence of multiple risk factors in patients further accelerates the incidence of ACS and for people who already have coronary heart disease and these additional risk factors can affect their recovery and future health.

Hence, it is important to identify the major risk factors and clinical profile of ACS in young adults so that future preventive measures can be taken in the form of lifestyle modification and pharmacotherapy. According to recent epidemiological studies, more than half of the worldwide cardiovascular disease burden will be borne by the Indian subcontinent in the next decade.[6] Cardiovascular risk factors for ACS are on the rise in people of Indian origin, and ACS is now the leading cause of death.[6-10] The present study was undertaken to observe and compare the clinical profile of ACS in male and female young adults.

Materials and Methods
Study design
Cross-sectional study.

Participants
The study was approved by the Institutional Ethics committee of Little Flower Hospital and Research Center, and informed consent was obtained from all the participants. 50 patients of either sex fulfilling the inclusion criteria admitted with ACS in Cardiac unit of Little Flower Hospital, Angamaly were recruited by purposive sampling.

Inclusion criteria
- All patients, males 45 years or younger and females 55 years or younger admitted to Little Flower Hospital with a diagnosis of ACS
  The final diagnosis of ACS will be based on two out of three of the following criteria:
- Ischemic chest pain for at least 30 min
- Electrocardiogram (ECG) evidence of ACS
- Rise/fall of the cardiac biomarker troponin I.

Exclusion criteria
- Stable angina
- Patients aged younger than 18 years
- Patients who are unwilling for the study.

Methods
History collection, clinical examination, ECG, echocardiography, laboratory investigations such as complete blood count, lipid profile, blood sugar level, cardiac markers, urine analysis, and other routine investigations done as a part of routine diagnosis and treatment.

Data analysis
Data were analyzed using SPSS 20.0. The statistical test used is regression analysis and Student's *t*-test.

Results
Female's age group is significantly different than males. Body mass index (BMI) (Figure 1) is not significantly different in males and female participants. NSTEMI incidence is significantly higher in females ($P < 0.001$) (Table 1). UA incidence is significantly higher in females ($P < 0.001$) (Table 1). While significantly higher incidence rate of STEMI ACS was observed in males ($P < 0.001$). 48.65% of male patients had dyslipidemia (DLP) (Table 2), while only 38.46% of female patients had DLP. The incidence rate of DLP was significantly ($P = 0.0067$) higher in male patients. Significantly greater number of male patients presented symptoms of chest pain/while female patients presented with symptoms of chest pain or chest discomfort (Table 3). The symptoms chest discomfort was significantly lower in male patients. While 7.69% of female patients presented with chest heaviness or abdominal pain, these symptoms were not observed among male patients (Table 3). A symptom of sweating was prominently observed
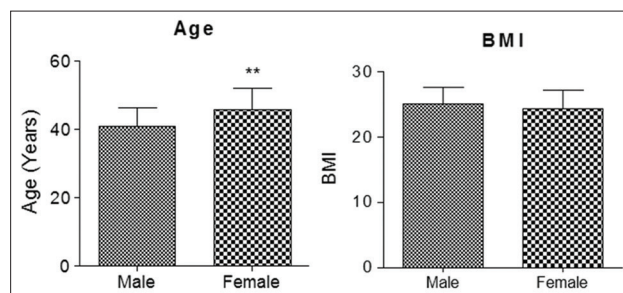
Figure 1: Demographic data of the participants (data expressed are mean ± standard deviation) (*$P<0.05$, **$P<0.01$, ***$P<0.001$)

in male patients, while symptoms of retrosternal pain and tiredness were exclusive to male patients. A symptom of vomiting was equally reported by both male and female patients. Furthermore, the observation of multiple symptoms was significantly ($P < 0.01$) higher among male patients. The weak positive correlation was observed between age and BMI; BMI and systolic blood pressure (SBP); BMI and diastolic blood pressure (DBP); fasting blood sugar (FBS) and SBP; FBS and DBP; FBS and

triglycerides (Figures 2-7). Female's age group is significantly different than males (Figure 1). BMI is not significantly different in males and female participants (Figure 1). Both systolic and diastolic pressures were not significantly different in the participants (Figure 8) high-density lipoproteins, FBS, low-density lipoproteins cholesterol are slightly higher in females; however, it is not statistically significant. Triglycerides and Troponin I were lower in females than males. However, it is not statistically significant (Figures 9 and 10). Blood urea and serum creatinine were slightly lower in females than males; however, it is not statistically significant. No difference in uric acid levels was observed (Figure 11). Serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic-pyruvic transaminase enzyme levels are lower in females when compared with males; however, it is not statistically significant (Figure 12). Sodium levels

Table 1: Incidence rate of types of ACS in male and female

Incidence rate of ACS			
Gender	NSTEMI (%)	STEMI (%)	UA (%)
Male	32.43	64.86	2.70
Female	46.15	38.46	15.38

Data were represented as percentage. STEMI: ST-segment elevation myocardial infarction, NSTEMI: Non-ST-segment elevation myocardial infarction, ACS: Acute coronary syndrome, UA: Unstable angina
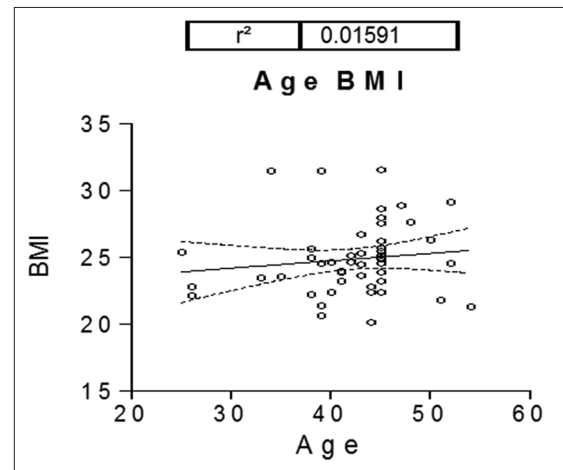
Table 2: Distribution of risk factors

Risk factors	Males (%)	Females (%)
Smoking	62.16	
Alcoholism	64.86	
Dyslipidemia	48.64	38.46
Diabetes mellitus	40.54	46.15
Hypertension	32.43	69.23
Obesity	8.1	
Family history	54.05	23.07

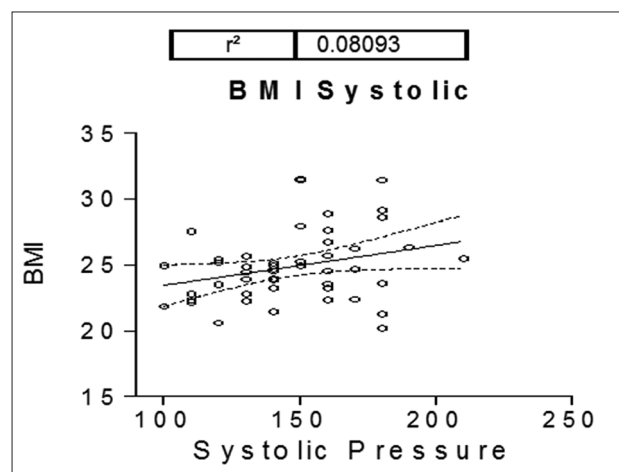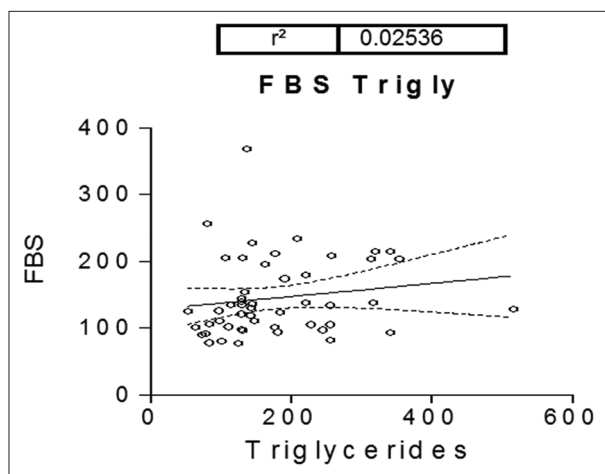**Table 3: Incident rate of presenting symptoms in male and female with ACS**

Incident rate of presenting symptoms		
Symptoms	Male (%)	Female (%)
Chest pain	83.78	46.15
Chest discomfort	5.41	38.46
Chest heaviness		7.69
Radiating chest pain	8.11	15.38
Sweating	24.32	15.38
Profuse sweating	2.7	
Vomiting	5.41	7.69
Retrosternal pain	10.81	
Abdominal pain		7.69
Tiredness	2.7	

ACS: Acute coronary syndrome

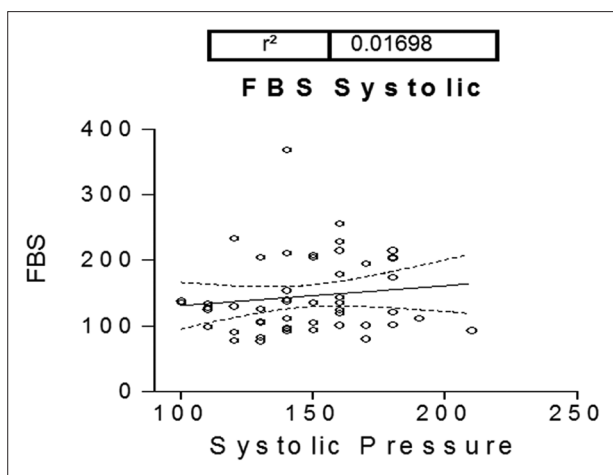**Figure 2**: Correlation of age and body mass index

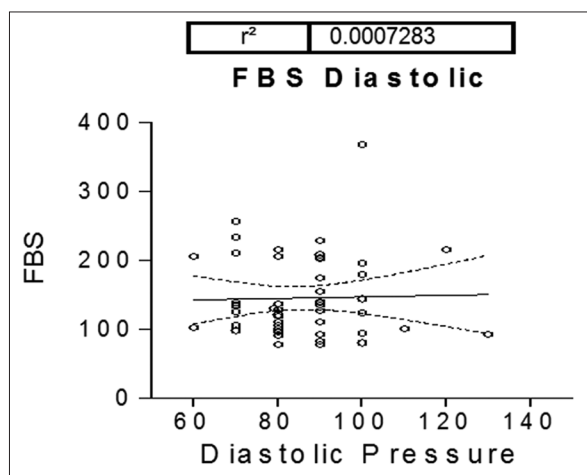**Figure 3**: Correlation of body mass index and systolic blood pressure
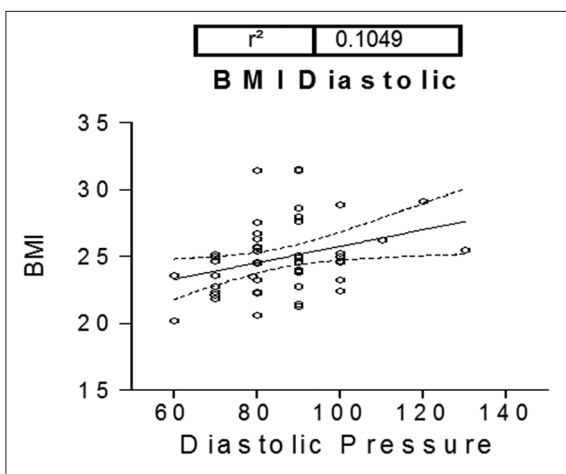
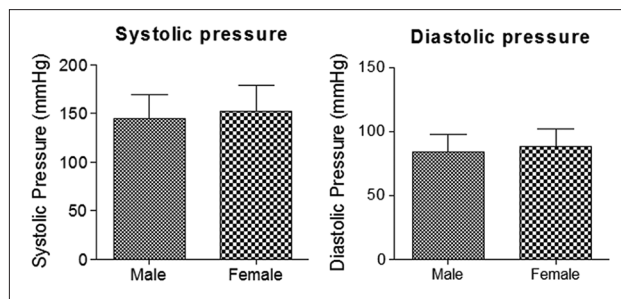**Figure 4**: Correlations of body mass index and diastolic blood pressure

Figure 5: Correlations of fasting blood sugar and systolic blood pressure

Figure 6: Correlations of fasting blood sugar and diastolic blood pressure


Figure 7: Correlations of fasting blood sugar and triglyceride

Figure 8: Systolic blood pressure and diastolic blood pressure of the participants (Data expressed are mean ± standard deviation) (*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$)
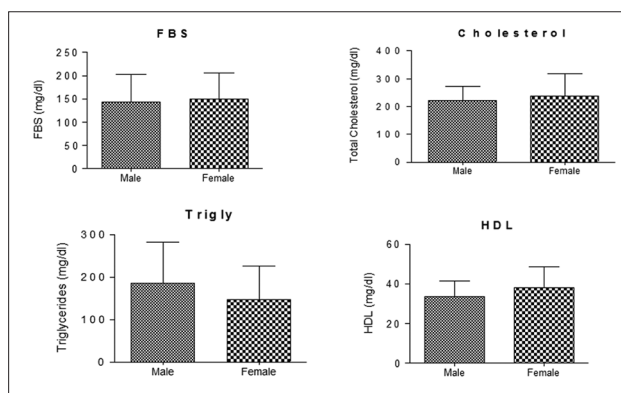

Figure 9: Fasting blood sugar, cholesterol, triglycerides, high-density lipoproteins levels of the participants (data expressed are mean ± standard deviation) (*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$)

are slightly lower in females, and potassium levels are slightly higher in females when compared with males; however, it is not statistically significant (Figure 13).
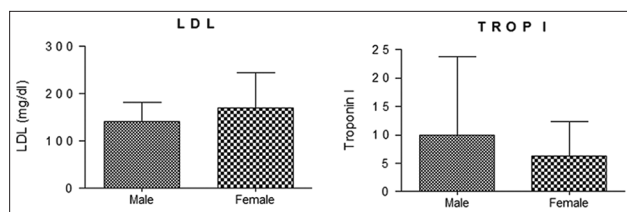
Figure 10: Low-density lipoproteins and troponin I levels of the participants (data expressed are mean ± standard deviation) (*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$)
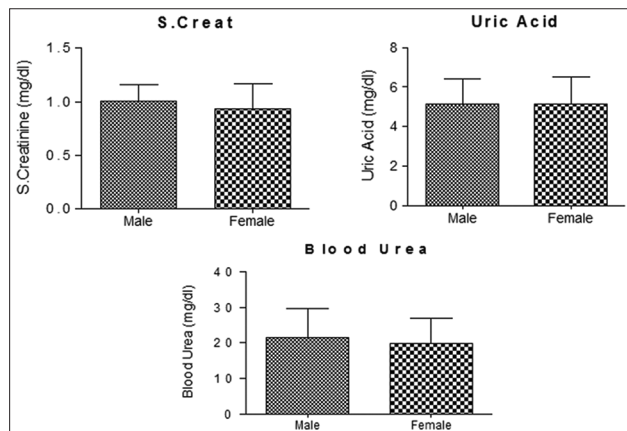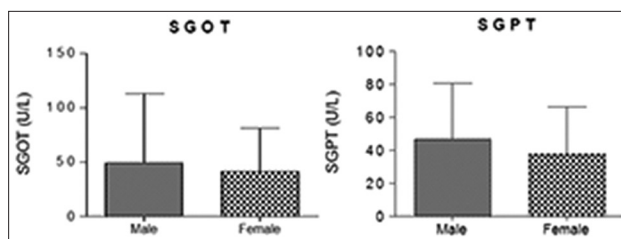

Figure 11: Blood urea, serum creatinine, uric acid in male and female with acute coronary syndrome (data expressed are mean ± standard deviation) (*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$)

Figure 12: Serum glutamic oxaloacetic transaminase/serum glutamic-pyruvic transaminase in males and females with acute coronary syndrome (data expressed are mean ± standard deviation) (*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$)

Figure 13: Na$^+$/K$^+$ ions levels in male and female with acute coronary syndrome (data expressed are mean ± standard deviation) (*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$)
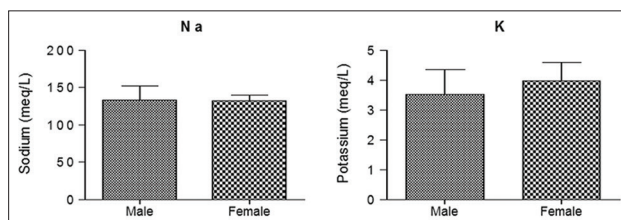
Discussion

It was reported that[11] the gender wise distribution of male and female shows 72% males and 28% females, 79% males, and 21% females, respectively. Earlier studies reported that that ACS in young is a disease of men. In the present study, it was observed that 74% male and 26% females are noticed with ACS. The mean age of patients in earlier studies was 37.03 and 32 years.[12,13] In the present study, the mean age of the patients was 42.06 years. Most of the patients were in the age group between 25 and 54 years. About 25% of ACS in India occurs under the age group of 40 years and 50% under the age group of 50 years. In this study, the chest pain was the most common presenting symptom found in patients with ACS, which is followed by sweating in most cases. A similar finding was reported in earlier studies.[12]

In the study, smoking was the most common risk factor presenting in males (64.86%), whereas it remains 0% in females. It was reported that[13] smoking is 76.9% and 75%, respectively. Many studies have shown that smoking is a major risk factor for MI. Hypertension was present in 69.23%

of the female cases in the study, whereas male cases show 32.43% only. This shows females are at a high risk of getting hypertension which is a major risk factor of ACS. Wander *et al*.[14] observed hypertension in 47% of the patients. The family history of coronary artery disease was present in 54.05% male patients and 23.07% female patients in the present study. Studies made by Bharani *et al*.[15] noted the family history of coronary artery disease in 40% and 38%, respectively, in the patients. The present study shows DLP in 48.64% males and 38.46% females. It was reported that 42% of patients had hypercholesterolemia. Diabetes mellitus was noticed in 40.54% in males and 46.15% in females.[15] Earlier studies reported that diabetes in 22% of their patients including male and female.[16] Obesity is an independent coronary risk factor. In the study, it has been observed that 38% were having BMI above 25%, and 6% were obese having BMI above 30. Similar observations were made by Kaur *et al*. who reported obesity in 7% and 11%, respectively. In this study anterior wall, MI was the most frequent location of MI on the ECG. This study notices 56% of anterior wall MI in patients with ACS. 38% of inferior wall MI in patients and 6% of patients with no ECG changes with the ACS (Tables 4-6). Earlier studies reported that 60.3% anterior wall MI and 39.6% inferior wall MI, 68% anterior wall MI and 29% inferior wall MI, respectively.[17]

Table 4: Distribution of types of coronary vessel diseases in male and female

Types of number of coronary vessels occluded	Male (%)	Female (%)
SVD	51.35	30.77
DVD	27.03	30.77
TVD	21.62	38.46

DVD: Double vessel disease, SVD: Single vessel disease, TVD: Triple vessel disease

Table 5: ECG findings diagnosing type of ACS in male and female

ECG findings	Male (%)	Female (%)
Inferior wall MI	59.46	46.15
Anterior wall MI	37.84	38.46
Others	2.70	15.39

ECG: Electrocardiogram, MI: Myocardial infarction, ACS: Acute coronary syndrome

Table 6: Treatment modality used in ACS patients

Treatment modality used	Number of patients
PTCA	39
Thrombolysis	2
Failed thrombolysis – PTCA	2
CABG	7

PTCA: Percutaneous transluminal coronary angioplasty, ACS: Acute coronary syndrome, CABG: Coronary artery bypass graft

Limitations
The sample size was small in the present study, and the study was conducted at a single center.

Conclusion
The present study indicates NSTEMI and UA incidence was higher in females and STEMI incidence was higher in males. We recommend further detailed multicenter study in this area with higher sample size to confirm the results and implement preventive measures for the benefit of the society in general.

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