Study of acute coronary syndrome in young adult and its associated risk factors

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Abstract
Background: Cardiovascular risk factors for acute coronary syndrome (ACS) are on the rise in people of Indian origin and ACS is now one of the most common leading causes of death. The currently available evidence, young patients represent 0.4-19% of all ACS cases, depending on the cut-off age used. Present study was planned to assess the prevalence of risk factors, presenting features and in-hospital and short-term outcomes of acute coronary syndromes in patients below 45 years. **Material and Methods:** Present study was hospital based, prospective, observational study, conducted in patients between 13-45 years, of either gender, admitted for acute coronary syndrome on the basis of anginal pain, suggestive electrocardiographic changes and elevated troponin-I levels/CPK-MB above upper limit of normal. **Results:** The study consisted of total number of 50 cases of young adult of acute coronary syndrome who were admitted Intensive Coronary Care Unit in tertiary care center. In the present study, the most common age group in young was found to be between 40 to 45 years (52%), followed by 30-39 years (46%). The mean age was 39.78±5.89 years. In the present study, most patients were male (78%) and female(22%). In the present study, common presentations in young group were chest pain (94%) followed by sweating (88%) and breathlessness (74%). Least common presentation was epigastric discomfort. In the present study, the most common risk factor in young were smoking and tobacco use (76%) followed by hypertension (64%) and then high body mass index (62%). And least common risk factor was type A personality disorder or stress induced. In the present study, the most common family history in young group was hypertension (64%) followed by coronary artery disease (56%).and diabetes mellitus (30%). In the present study, the most common ECG changes in young adult were anterior wall infarction (42%), inferior wall infarction (28%), ST segment depression (14%) and Deep T wave inversion (8%), The most common ECG changes were STEMI (78%) followed by NSTEMI (22%) in young group. In the present study, the most common events during hospital stay were combined events (32%) followed by LV failure (12%) and cardiogenic Shock (10%) in young group. 49 patients get discharge after treatment. (Combined events- arrhythmia, ventricular failure, pulmonary embolism, cardiac arrest, and reinfarction) **Conclusion:** Oral tobacco consumption, hypertension, diabetes, dyslipidemia and alcohol consumption were other important modifiable risk factors in young adults. Other risk factors such as family history of premature CAD was also prevalent in young adults.
Keywords: Oral tobacco consumption, hypertension, diabetes, dyslipidemia, premature CAD, adult coronary syndrome

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INTRODUCTION

Coronary artery disease is a most common non communicable disease in India and it is the leading cause of death in developed and developing countries.[1] Acute coronary syndrome (ACS) - which includes ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina-is an umbrella term for life-threatening situations that occur when the blood supply to the heart is blocked due to destabilization of a previously stable atherosclerotic plaque.[1,2] Cardiovascular risk factors for

ACS are on the rise in people of Indian origin and ACS is now one of the most common leading causes of death.[3] 25% of acute myocardial infarction in India occur in less than 45 year of age current life style of certain young individual which can be commonly characterized by smoking, alcohol drinking, drugs like cocaine, amphetamine, high fat diet, fast food, and high work stress contributes to the increasing incidence of ACS.[1,2] Strategies for the treatment and prevention of heart disease can be highly effective and have been subjected to rigorous evaluation. The evidence-based treatment of cardiovascular disease is stronger than for almost any other disease group.[4] 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.[3,5] Present study was planned to assess the prevalence of risk factors, presenting features and in-hospital and short-term outcomes of acute coronary syndromes in patients below 45 years.

MATERIAL AND METHODS

Present study was hospital based, prospective, observational study, conducted in Department of General Medicine, Dr Shankarrao Chavhaan Government Medical Collage, Nanded, India. Study duration was of 18 month (August 2018 to January 2020). Approval from the Institutional Ethics Committee was taken prior to the commencement of the study.

Inclusion criteria: All patients between 13-45 years, of either gender, admitted for acute coronary syndrome on the basis of anginal pain, suggestive electrocardiographic changes and elevated troponin-I levels/CPK-MB above upper limit of normal.

Exclusion criteria: Patients of less than 13 years OR more than 45 year of age. patients with old ischemic heart disease, with known congenital heart disease. Patients with proven non-cardiac chest pain. Patients who died before confirm diagnosis of ACS.

Study was explained and a written informed consent was taken for participation. Demographic details, clinical presentation (history and examination), electrocardiography findings and cardiac biomarkers, other laboratory investigations were noted.

The following investigations were done in every patient as Complete Blood Count, CPK-MB-Between 12-16 hours of symptom onset. Repeat test after 24 hours, if 1st test is normal and clinically high index of suspicion of ACS, Cardiac Troponin I-After 2 hours of symptom onset, Electrocardiography (serial ECG monitoring), Homocysteine level, Fasting ESR (Wintrobe method),

Urine routine and microscopy examination, Renal function test, Liver function test, Serum electrolyte, Lipid profile-Within 24 hours of symptom onset, Random blood sugar (FBS and PPBS if diabetic and needed), 12 leads ECG was used.

DIAGNOSTIC CRITERIA

1. Clinical presentation (history and examination)-Chief complains with duration (chest pain, breathlessness, sweating, palpitation, vomiting, giddiness, abdominal pain, syncope), medical history/past history and risk factors (similar illness, diabetes mellitus, hypertension, anemia, history of taking any drugs, history of tobacco consumption in any form, obesity, dyslipidemia, past history of IHD), personal history, family history were noted. Clinical examination findings such as pulse rate (rate/rhythm, tenson, force, volume, radio-radial/radio-femoral delay/equality, all other peripheral pulse), blood pressure, weight, BMI, height, respiratory rate, pallor, temperature, icterus, cyanosis, clubbing, signs of atherosclerosis, edema, JVP were noted. Detailed cardio vascular system examined.

2. Electrocardiography findings and cardiac biomarkers –

Diagnosis of ACS (STEMI and NSTEMI) is made if there is: Elevated troponin I levels / CPK-MB above upper limit of normal and with at least one of the following[6]:

1. Myocardial ischemic symptoms e.g.- chest pain, palpitation, dyspnea, diaphoresis, epigastric discomfort
2. Development of pathologic Q waves on the ECG
3. ECG changes indicative of ischemia (ST segment elevation, depression, T wave inversion).
4. Cases of ischemic symptoms with elevation of ST segment in electrocardiographic (ECG) leads/presumed new onset left bundle branch block in ECG are categorized as STEMI.
5. Cases of ischemic symptoms without ST segment elevation are categorized as NSTEMI if their cardiac biomarkers are positive.

Unstable Angina (UA) is defined as angina pectoris (or equivalent type of ischemic discomfort) with at least one of three features without elevation in cardiac markers[6]

1. Occurring at rest (or minimal exertion) and usually lasting >20 min (if not interrupted by nitroglycerin administration)
2. Being severe and described as frank pain on exertion and of new onset (i.e., within 1 month.)
3. Occurring with a crescendo pattern (i.e., more severe, prolonged or frequent than previously.

Data was collected and compiled using Microsoft Excel, Statistical analysis was done using descriptive statistics.

RESULTS

The study consisted of total number of 50 cases of young adult of acute coronary syndrome who were admitted Intensive Coronary Care Unit in tertiary care center. In the present study, the most common age group in young was found to be between 40 to 45 years (52%), followed by 30-39 years (46%). The mean age was 39.78±5.89 years. In the present study, most patients were male (78%) and female(22%).

Table 1: Age and gender distribution

Age group (in years)	Number (n)	Percentage (%)
13-20	0	0
20—29	1	2
30—39	23	46
40-45	26	52
Gender		
Male	39	78
Female	11	22
Ratio (M : F)	3.54 : 1	

In the present study, common presentations in young group were chest pain (94.0%) followed by sweating (88%) and breathlessness (74%). Least common presentation was epigastric discomfort.

Table 2: Presenting symptoms

Presenting complaints	Number (n)	Percentage (%)
Chest Pain without Radiation	47	94
Chest Pain with Radiation	45	90
Sweating	44	88
Breathlessness	37	74
Palpitation	20	40
Vomiting	15	30
Giddiness	12	24
Epigastric discomfort	5	10

In the present study, the most common risk factor in young were smoking and tobacco use (76%) followed by hypertension (64%) and then high body mass index (62%). And least common risk factor was type A personality disorder or stress induced.

Table 3: Risk factors

Risk factors	Number (n)	Percentage (%)
Alcohol	24	48
Smoking	29	58
Tobacco Use	38	76
Smoking + Tobacco Use	38	76
Hypertension	32	64
Diabetes Mellitus type 1 And type 2	15	30
Stress induced/type a personality disorder	3	6
Dyslipidemia	30	30
Family history	28	56
High BMI	31	62
Chronic kidney disease	17	34
Sedentary life style	20	40
Sickle cell anemia	3	6
High homocysteine level	7	14

In the present study, the most common family history in young group was hypertension (64.%) followed by coronary artery disease (56%).and diabetes mellitus (30%).

Table 4: Family history

Family history	Number (n)	Percentage (%)
Hypertension	32	64
Diabetes Mellitus	15	30
Coronary Artery Disease	28	56

In the present study, the most common ECG changes in young adult were anterior wall infarction (42%),inferior wall infarction (28%), ST segment depression (14%) and Deep T wave inversion (8%), The most common ECG changes were STEMI (78%) followed by NSTEMI (22%) in young group.

Table 5: ECG findings

ECG findings	Number (n)	Percentage (%)
ST elevation	39	78
Anterior wall MI	21	42
Inferior wall MI	14	28
Lateral wall MI	1	2
Anterolateral wall MI	3	6
NSTEMI	11	22
ST depression	7	14
Deep T wave inversion	4	8

In the present study, the most common events during hospital stay were combined events (32%) followed by LV failure (12%) and cardiogenic Shock (10%) in young group. 49 patients get discharge after treatment. (Combined events- arrhythmia, ventricular failure, pulmonary embolism, cardiac arrest, and reinfarction)

Table 6: Events And Outcome In The Hospital

Events And Outcome	Number (n)	Percentage (%)
Stroke	0	0
LV Failure	6	12
Recurrent Ischemia/Angina	1	2
Cardiac Arrest	0	0
Cardiogenic Shock	5	10
Pulmonary Embolism	0	0
Bleeding requiring Transfusion	0	0
Death	1	2
Combined events	16	32
Discharge	49	98

DISCUSSION

Prompt recognition of heart disease is limited by two key factors. Firstly, it is often latent and coronary artery disease can precede to an advanced stage before the patient notices any symptoms. Secondly, the diversity of symptoms attributable to heart disease is limited, so different pathologies may frequently present with the same symptoms.[4] For long time, coronary heart disease has been considered as a disease of older people. Acute coronary syndrome is not uncommon in the young population as previously thought. Under diagnosis of chest pain or epigastric discomfort due to either acid peptic disorder or alternative musculoskeletal causes lead to misdiagnosis and mismanagement of the patients. Acute coronary syndrome (ACS) among young adults is relatively low when compared with older population. The prevalence of young patients of less than 45 years of age among ACS patients is variable depending on the population studied and generally ranges from less than 2 to 10 %.[5] Smoking, hypercholesterolemia and low high-density lipoprotein (HDL) levels are associated with CAD in young patients. In addition, obesity, insulin resistance, and hypertriglyceridemia are risk factors for CAD in the young population.[7] In our study, patients between 13-45 years of age were included. Most of the young ACS patients were in the age group of 40-45 years (52%) followed by 30-39 years (46%). The mean age was 39.78± 5.89 years. This finding is consistent with the study of Saumya Gupta et al.[8], Ricci et al.[9], Wei-Che Tsai et al.[10] and Sabiye Y et al.[11] who reported the mean age as 35 years, 45.3 ± 6 years, 36.08 years and 41.7 ± 4.1 years respectively in young adults. Most of the young ACS patients in our study were males (78.%) and female 22% , this correlates with the observation made by Saumya Gupta et al.[8] who reported a male preponderance of 76.67% and male : female ratio in young adults as 3.28: 1. Similar results were seen in the studies by Wei-Che Tsai et al.[10] and Sabiye Y et al.[11] who reported a male preponderance with 89.8% and 84.7% respectively. In the study by P. Yadav et al. [12] common presentations in young patients were chest pain (94 %), followed by sweating (78%) and breathlessness (67%). Shah and Jain[13] also reported that young ACS patients presented with chest pain (85.05%) followed by sweating (61.68%) and difficulty in breathing (39.25%). Similar results were also reported by Puricelb S et al., [14] and Sarr et al., [15] who found that chest pain was 85% and 95.2% in young patients respectively. In our study, tobacco consumption at any form smoking, chewing (76 %) was the strongest risk factor in young adults which is consistent with the study of Wei-Che Tsai et al., [10] who observed that percentage of smoking was 57.1% in young adults. Smoking as a strongest risk factor also correlates with the observation made by K. Matsis et al.,[16] Panduranga P et al.,[7] Chugh A et al.,[17] and Teixeira M. et al.,[17] who also reported that percentage of smoking were 47%, 47%, 77.24% and 82.8% respectively in young adults. In the

present study, alcohol was found in 48% of young adults as a risk factor in contrast with the study by Chugh A *et al.*,[17] in which only 36.6% of study population was associated with alcohol as a risk factor in young adults. Proportion of tobacco and smoking use has been found to be higher in the present study.

Hypertension (64%) was also very high in our study in young adults. This finding is consistent with the study of Chugh A *et al.*,[17] Wei-Che Tsai *et al.*,[10] Teixeira M. *et al.*,[18] and Panduranga P *et al.*,[7] who observed the presence of hypertension as 27.64%, 29.8%, 28.9% and 29% respectively in young adults. Diabetes mellitus (30%) was also significantly higher in our study in young adults. This correlates with the observation made by Shah and Jain[13] and P. Yadav *et al.*,[12] who reported the presence of diabetes mellitus as 20.45% and 16% respectively in young adults. In the present study, 64% of young adults with ACS had family history of hypertension This correlates with the observation made by Sabiye Yilmaz *et al.*,[11] K. Matsis *et al.*,[16] and Puricelb S *et al.*,[14] who reported family history of coronary artery disease as 33.8%, 48.7% and 44% respectively in young adults with ACS. However, this contradicts the results of Saumya Gupta *et al.*,[8] Sarr *et al.*,[15] and Panduranga P *et al.*,[7] who observed that 13%, 9.5% and 16% of young ACS patients had a family history of coronary artery disease. The most common ECG changes in young adult were anterior wall infarction (42%) in our study. P.Yadav *et al.*,[12] reported the anterior wall myocardial infarction was the most common site of presentation (54%) as also observed by Deshpandey J.D. *et al.*,[19] Shah and Jain,[13] also observed that anterior wall infarction was the commonest type in young (96.26%). In our study, the most common ECG changes were STEMI (78%) in young adults. Shah and Jain[13] and Sarr *et al.*,[15] also reported similar findings who observed that percentage of STEMI was 98.13% and 85.7% respectively in young adults. Contradictory results were noted by Chugh A *et al.*,[17] Saumya Gupta *et al.*,[8] and Sabiye Yilmaz *et al.*,[11] who found that percentage of STEMI was 71.5%, 63% and 49.3% respectively in young adults. In our study, 12% of young patients had LV failure. Similar results were observed by Chugh A *et al.*,[17] and Sabiye Yilmaz *et al.*,[11] who reported that percentages of LV failure were 13% and 13.1% respectively in young adults. In contrast, Panduranga P *et al.*,[7] reported that percentage of LV failure was 6% in young adults. Percentage of cardiogenic shock was 10% in young adults in the present study. This finding is consistent with the study of Chugh A *et al.*,[17] and Shah and Jain[13] who observed that percentage of cardiogenic shock was 8% and 6.54% respectively in young group. The in-hospital mortality rate was 2% in young adults in the present study. Tungsubutra W *et al.*,[20] found that in-hospital mortality rate was 7.4% in young adults but this

contradicts the findings of Chugh A *et al.*,[17], Wei-Che Tsai *et al.*,[10] A. S. M. Zuhdi *et al.*,[21] and Singh Y *et al.*,[22] who observed that in-hospital mortality rates were 1.63%, 4.8%, 4.8% and 3.36% respectively in young adults. The mortality rate was 2% in young adults in our study. S. M. Zuhdi *et al.*,[21] observed that in young adults, 5.6% of the patients expired at 30-day follow-up whereas Ricci *et al.*,[9] and Sabiye Yilmaz *et al.*,[11] found that 1.3% and 1.2% of the patients expired at the 30-day follow-up.

Limitation of present study were, conducted in an urban set up in a tertiary care hospital, short study period and small sample size. Further detailed multicenter studies with a higher sample size to confirm the results and implement preventive measures for the benefit of the society in general are recommended.

CONCLUSION

Oral tobacco consumption, hypertension, diabetes, dyslipidemia and alcohol consumption were other important modifiable risk factors in young adults. Other risk factors such as family history of premature CAD was also prevalent in young adults. Education of patients about cessation of smoking, control of diabetes and hypertension and also educating about modification of other risk factors can serve as primary prevention of ACS in both young adult and elderly age group.

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