A PROSPECTIVE OBSERVATIONAL STUDY ON ACUTE CORONARY SYNDROME IN YOUNG PATIENTS AT TERTIARY CARE TEACHING HOSPITAL

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Abstract

Background: There has been an increase in the prevalence of cardiovascular risk factors associated with acute coronary syndrome (ACS) among people of Indian ancestry, and ACS has emerged as a major cause of mortality in this population. According to the data we have at the moment, young patients account for 0.4% to 19.0% of all ACS cases, depending on the age threshold that is employed. The goal of the current investigation was to determine the prevalence of the most common cause of Acute Coronary Syndrome in young individuals.

Methodology: Patients between 25 and 44 years old, of either gender, who were hospitalised with suspected ACS symptoms beyond the upper limit of normal were included in this prospective observational study.

Results: The study consisted of total number of 147 cases of young adult of acute coronary syndrome who were admitted Cardiology Unit in tertiary care centre. Patients included in the study of which 112 (76.2%) were male patients and 35 (23.8 %) were female patients. In this study, three different types of acute coronary syndrome were encountered during our study which includes 81 (55.1%) patients are with NSTEMI, 50 (34 %) are with AWMI and 16 (10.9%) are with IWMI. In our study, Smoking & Alcoholic were the major cause for ACS in young patients constituting 78 (53.06%). The ACS patients, prescribed with Anti platelets (97.9%), Anti coagulants (99.3%), HMG-CoA reductase inhibitors (100%), Proton pump inhibitors (100%), Beta blockers (28.5%), Diuretics (13.6%) & Vasodilators (4.08%).

Conclusion: Smoking, 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: Smoking, hypertension, diabetes, dyslipidaemia, premature CAD, adult coronary syndrome

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INTRODUCTION

The major cause of death in both high- and low-income countries is coronary artery disease (CAD), a kind of cardiovascular disease. Stable angina, unstable angina, myocardial infarction (MI), and sudden cardiac death are all symptoms of coronary artery disease (CAD), an atherosclerotic illness with an inflammatory component. The rate of smoking among adults in the United States was 15.5% in 2016.[2] Men are more prone to these tendencies than women. One of the most significant modifiable risk factors for CAD is hypercholesterolemia. Higher high-density lipoproteins (HDL) reduce the prevalence of coronary artery disease (CAD), while higher low-density lipoproteins (LDL) increase the risk for CAD. Inflammatory markers are also major contributors to the development of coronary artery disease. Although some research suggests high-sensitivity C-reactive protein (hsCRP) is the best predictor of coronary artery disease, its practical applications remain debatable.[1-3]

Coronary artery disease is a major global health problem. According to one study, CAD accounts for 32.7% of cardiovascular diseases and 2.2% of the worldwide burden of disease.[4,5] Coronary artery disease (CAD) is expected to increase by 120 percent in women and 137 percent in men in developing countries by 2020.[6] When compared to all other emerging countries, India has had the quickest epidemiologic shift from communicable to noncommunicable diseases, with a high burden of atherothrombotic-dominated noncommunicable disorders. Coronary artery disease (CAD) is the most common kind of heart disease in India.[7] There is a high correlation between SES and cardiovascular disease mortality and morbidity, according to a number of research. Patients from lower socioeconomic backgrounds are more likely to experience adverse outcomes. In both sexes, the prevalence of CAD increases with age.[8] According to the French registry ONACI, the rate of CAD increased from around 1% in the 45-to-65 age group to nearly 4% in the 75-to-84 age group.[9]

Every year, nearly 6.5 million individuals die from coronary artery disease around the world. Every year, about 200,000 people in the United Kingdom die from cardiovascular disease, with CHD accounting for nearly half of these deaths. CVD is responsible for about 30% of premature deaths in males (under 75 years old) and 22% of early deaths in women.[10, 11] coronary artery disease (CAD) is a worldwide health concern that will become the main cause of death by 2020. In India, cardiovascular illnesses, particularly coronary artery disease (CAD), account for 26% of all deaths. In compared to the western world, CAD in India is characterised by early onset in the young, as well as high mortality and diabetes mellitus prevalence in the poor and moderate-income groups. According to WHO the new age classification, the young age is from 25 to 44, middle age is 44-60, elderly age is 60-75, senile age is 75-90 and long-livers are after 90.[12-30] In this study we are estimating the prevalence rate of Acute Coronary Syndrome in young patients with the most common Cause.

MATERIALS AND METHODS

All ACS patients from Inpatient and Outpatient units of Cardiology Department of Santhiram Medical College and General hospital in Nandyal included into the study. The study was a prospective hospital based observational study. The Study Period was 6 months from November 2021 to April 2022. The source for data collection was from the patient case notes and by interviewing the patients. The sample size for the study was calculated based on the single proportion sample size formula. The sample size was 114 by considering the proportion 8% at 95% confidence level and 5% margin of error. But the collected samples for the study was 147. These population have taken into the based on the inclusion criteria and exclusion criteria. Inclusion criteria includes Patients with age group 25-44, Patient who are admitted clinically with ACS in hospital, Patients with co-morbid conditions related to ACS, Patient with suspected ACS symptoms, Participants who were given written informed consent form. Exclusion criteria includes Participants unwilling to join the study, patients missed from the follow up, incompletion data sheets.

Statistical analysis

Data were recorded in a proforma and all the data was entered into Microsoft Excel 2016. Data were expressed by mean ± standard deviation (SD), proportions. All the statistical analysis was done using the Graph Pad Prism 9.3.1 version.

RESULTS

A total number of 147 patients included in the study of which 112 (76.2%) were male patients and 35 (23.8 %) were female patients. The male to female ratio among patients was 3:1. The young ACS patients were divided into 4 groups based on their age groups according to WHO guidelines. When categorized age group wise, maximum number of patients 57.8 % were from the age group of 41-44 years, followed by 24.5 % were from 36-

40 years, 12.2 % were from 31-35 years and significantly lower number of patients in the age i.e., 5.4 % of 25-30 years. In this study, three different types of acute coronary syndrome were encountered during our study which includes 81 (55.1%) patients are with NSTEMI, 50 (34 %) are with AWMI and 16 (10.9%) are with IWMI. In our study, chest pain with SOB observed in more patients constituting 69 (46.9%), followed by Chest pain, SOB & Vomiting constituting 30 (20.4%), Chest tightness & SOB constituting 22 (14.9%), Chest pain, SOB & sweating constituting 16 (10.8 %), and a smaller number of ACS patient have only chest pain 10 (6.8 %).

Causes of ACS in patients

In our study maximum number of patients 94 (63.9%) have normal BMI 69 (46.9%), followed by 45 (30.61%) have Over weight, 6 (4.08%) have Class 1 Obesity and significantly lower number of patients i.e., 2 (1.36%) have Class 2 Obesity. In our study, Smoking & Alcoholic were the major cause for ACS in young patients constituting 78 (53.06%), followed by Hypertension, Alcoholic & Smoking constituting 31 (21.09%), Hypertension constituting 18 (12.24%) and with unknown reason (Idiopathic) constituting 20 (13.61%). In our study, among 147 young acute coronary syndrome patients, 35 (23.81%) were Co-Morbid with Hypertension, 27 (18.37%) were Co-Morbid with Diabetes Mellitus, 28 (19.05%) were Co-Morbid with Dyslipidaemia and 16 (10.88%) were Co-Morbid with Hypertension & Diabetes Mellitus. In our study, among 147 young acute coronary syndrome patients, 15 (10.20%) have family history with Hypertension, Diabetes Mellitus & Heart stroke, 6 (4.08%) have family history with Hypertension, 2 (1.36%) have family history with Diabetes Mellitus and 124 (84.3%) have idiopathic. In our study, among 147 young acute coronary syndrome patients 55.1% suffered with NSTEMI diagnosed troponin values found to be 0.204 ± 0.026, 34% suffered with AWMI diagnosed troponin values found to be 0.312 ± 0.046, 10.9% suffered with IWMI diagnosed troponin values found to be 0.382 ± 0.014. This information was shown in Table 1.

Treatment of Acute coronary syndrome in young patients

In our study, among 147 young acute coronary syndrome patients, 144 (97.9%) were prescribed with Anti platelets, 146 (99.3%) prescribed with Anti coagulants, 147 (100%) were prescribed with HMG-CoA reductase inhibitors, 147 (100%) were prescribed with Proton pump inhibitors, 42 (28.5%) were prescribed with Beta blockers, 20 (13.6%) were prescribed with Diuretics & 6 (4.08%) were prescribed with Vasodilators. This information was presented in Table 2 and Figure 1.

ACS Category wise ditribution of drugs

Among 147 patients Aspirin & Clopidogrel (Anti platelets), Heparin (Anti-Coagulant), Atorvastatin (HMG-CoA reductase inhibitors) and Pantoprazole (Proton pump inhibitors) were prescribed in all types of ACS in young patients. The drugs like Nitro-glycerine is given as vasodilator in specifically NSTEMI condition, Metoprolol is given as beta blocker in AWMI & IWMI Patients, Torsemide & spironolactone is given as Diuretic in AWMI & IWMI Patients, Telmisartan is given as ARB's to control hypertension in AWMI Patients and Insulin is given as anti diabetic in all types of ACS whos have comorbid with diabetis. The information was shown in Table 3.

Table 1: Demographics and Causes for ACS

Variables	Male	Female	Total	%	P Value
AGE					
25-30	7	1	8	5.4	0.238
31-35	17	1	18	12.2	
36-40	30	6	36	24.5	
41-44	58	27	85	57.8	
TOTAL	**112**	**35**	**147**		
Type of ACS					
NSTEMI	54	27	81	55.1	0.199
AWMI	45	5	50	34	
IWMI	13	3	16	10.9	
TOTAL	**112**	**35**	**147**		
Chief complaints					
Chest pain	9	1	10	6.8	0.22
Chest pain with SOB	52	17	69	46.9	
Chest pain with SOB as well as Vomiting	16	14	30	20.4	
Chest tightness, SOB	22	0	22	14.9	
Chest pain, SOB, sweating	7	3	16	10.8	

BMI					
18.5-24.9 (Normal weight)	78	16	94	63.9	0.238
25.0-29.9 (Over weight)	30	15	45	30.61	
30.0-35.0 (Obese class1)	5	1	6	4.08	
36.0-41.0 (Obese class 2)	1	1	2	1.36	
Co-Morbidities					
Hypertension	27	8	35	23.81	0.238
Diabetes Mellitus	21	6	27	18.37	
Dyslipidaemia	18	10	28	19.05	
Hypertension & Diabetes Mellitus	8	8	16	10.88	
Main Causes for ACS					
Hypertension (HTN)			18	12.24	
Smoking			78	53.06	
HTN with Alcoholic & Smoking			31	21.09	
Idiopathic			20	13.61	

Table 2: Treatment of Acute coronary syndrome in young patients

Drug categories	Drug Name	No. of Patients	%
Anti platelets	Aspirin	147	100
	Clopidogrel	147	100
Anti coagulants	Heparin	147	100
HMG-CoA reductase inhibitors	Atorvastatin	147	100
Vasodilators	Nitroglycerin	82	55.78
PPI	Pantoprazole	147	100
Beta blockers	Metoprolol	58	39.46
Diuretics	Torsemide & spironolactone	65	44.22
Anti diabetic	Insulin	44	29.93
ARB's	Telmisartan	47	31.97

Table 3: ACS Category wise ditribution of drugs

S. No	Type of ACS	Drugs	No. of Patients	%
1	NSTEMI	Atorvastatin, Nitroglycerin, Heparin, pantoprazole, Aspirin & Clopidogrel	36	24.49
2		Atorvastatin, Nitroglycerin, Heparin, pantoprazole, Aspirin Clopidogrel & Insulin	17	11.56
3		Atorvastatin, Nitroglycerin, Heparin, pantoprazole, Aspirin Clopidogrel &Telmisartan	18	12.24
4		Atorvastatin, Nitroglycerin, Heparin, pantoprazole, Aspirin, Clopidogrel, Telmisartan & Insulin	11	7.48
5	AWMI	Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone & Metoprolol	27	18.37
6		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone, Metoprolol & Insulin	8	5.44
7		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone, Metoprolol & Telmisartan	10	6.80
8		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone, Metoprolol, Telmisartan & Insulin	4	2.72
9	IWMI	Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone	2	1.36
10		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone & Insulin	2	1.36
11		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone & Metoprolol	7	4.76
12		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone, Metoprolol & Insulin	1	0.68
13		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone, Metoprolol, Insulin & Telmisartan	1	0.68
14		Aspirin, Clopidogrel, Atorvastatin, Pantoprazole, Heparin, Torsemide & spironolactone & Telmisartan	3	2.04

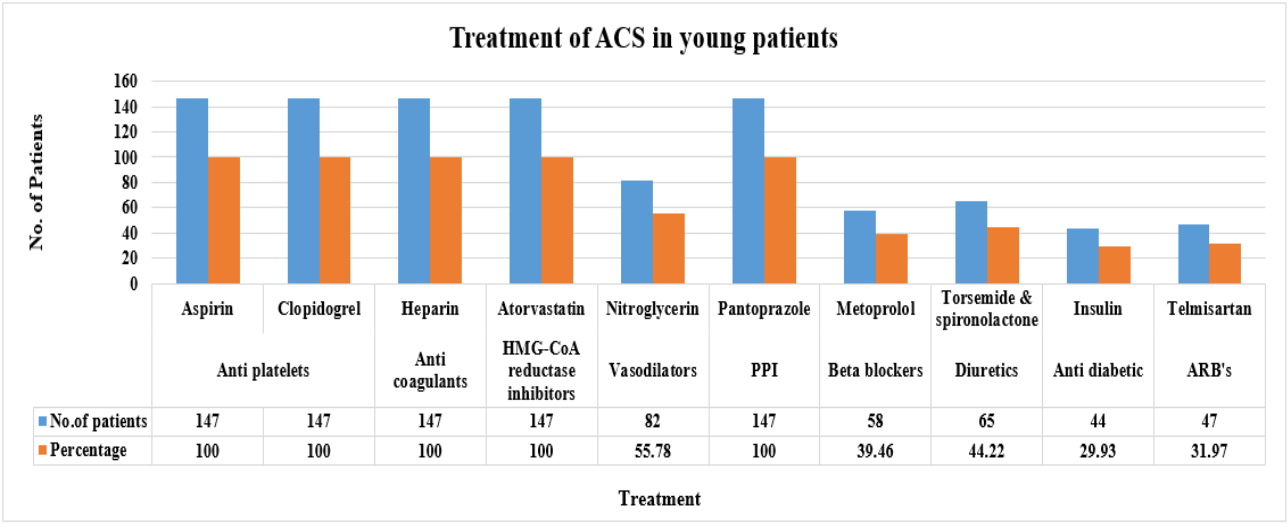

Figure 1: Treatment of ACS in young patients

DISCUSSION

Acute coronary syndrome is a group of symptoms and conditions caused by myocardial ischemia. It includes both non-ST-elevation myocardial infarction and unstable angina, as well as ST-elevation myocardial infarction.[46] Ischemic heart disease most often manifests in the form of a myocardial infarction. It's when a clot in the coronary artery causes the heart muscle to die suddenly. Therefore, a prescription-based study is one of the most useful methods that have been utilised to assess doctors' prescription practises.[47, 48]

In the present study, out of 147 patients, 112 (76.2%) were male patients and 35 (23.8 %) were female patients. Average age was between 41-44 years of both male and female. The results found to be consistent with study conducted by Tammiraju Iragavarapu *et al* and indicated that the young patients at the age group of 41-44 is more prone to effected by ACS.[49]

In this study, different types of ACS were identified which includes 81 (55.1%) patients are with NSTEMI, 50 (34 %) are with AWMI and 16 (10.9%) are with IWMI. 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 Major number number of young patients suffered with NSTEMI and risk increased with age. [50]

Chest discomfort, chest pain, shortness of breath, and perspiration were the symptoms that ACS patients in this study presented with the most frequently. Previous research has also found something similar.[51, 52]

In our study maximum number of patients 94 (63.9%) have normal BMI 69 (46.9%), followed by 45 (30.61%) have Over weight, 6 (4.08%) have Class 1 Obesity and significantly lower number of patients i.e., 2 (1.36%) have Class 2 Obesity. Based on observation BMI not plays that much crucial role in incidence of ACS in young patients. A similar finding was reported in earlier studies. [51]

Use of tobacco significantly increases young adults' risk of developing ACS. The risk of MI increases by a factor of 6.7 if the current rate of smoking is more than 10 cigarettes per day. 52 Quitting smoking reduces the risk of ACS almost immediately and eliminates it entirely within three to five years.[68] Some surveys have placed the percentage of Indians who are smokers at between 28.5 and 30 percent.[53] Cigarette smoking has a significant impact on many potential coronary risk factors. Among the unfavourable consequences is an increase in platelet activity. Smoking causes platelet activation, which is associated with thrombus formation and the development of MI.[54] 92% percent of young CAD patients surveyed by Zimmerman *et al*., were smokers. 55 The prevalence of smoking was found to be higher among individuals under the age of 40 (58.7%) than among those over the age of 40 (43%) by Mukherjee *et al*.[56] Although there has been a drop in the number of young individuals who smoke, the total smoking rate remains high.[57] It is the main cause of risk in the Indian population, according to research by Pais *et al*. as found to be a significant risk factor for CAD. Our study found that among the younger age group, 25.8% were current smokers. When comparing smoking rates between generations, young folks significantly outpace their elder counterparts. Similar to prior research, ours shows that cigarette smoking is a major contributor to an earlier onset of CAD. [49, 58, 59]

In our study, among 147 young acute coronary syndrome patients, 35 (23.81%) were Co-Morbid with Hypertension, 27 (18.37%) were Co-Morbid with Diabetes Mellitus, 28 (19.05%) were Co-Morbid with Dyslipidaemia and 16 (10.88%) were Co-Morbid with Hypertension & Diabetes Mellitus. Although the specific mechanism by which systemic hypertension causes ACS is unknown, there is evidence that it leads to LV hypertrophy and the advancement of atherosclerosis, which in turn leads to CAD.[60] Among the young people analysed, hypertension was found to be a major risk factor. This is consistent with the findings of the Sofia and EUROSPIRE studies, in which high blood pressure was found to be a significant risk factor for ACS; however, these studies did not find any statistically significant.[61]

In terms of health impact, diabetes in India is second only to ACS. The number of Indians diagnosed with diabetes rose from 32 million to 50 million over the past decade, and it's projected to rise to 87 million by 2030.[62] percent of South Asians have a greater than average risk of coronary heart disease due to factors like hyperinsulinemia, insulin resistance, and the prevalence of metabolic syndrome in people with type 2 diabetes.[63, 64] Many prior investigations have already established this to be the case.**[60]**

In our study, among 147 young acute coronary syndrome patients, 15 (10.20%) have family history with Hypertension, Diabetes Mellitus & Heart stroke, 6 (4.08%) have family history with Hypertension, 2 (1.36%) have family history with Diabetes Mellitus and 124 (84.3%) have idiopathic. Based on our results family history is not have significant incidence with ACS in Young patients.

In our study, among 147 young acute coronary syndrome patients 55.1% suffered with NSTEMI diagnosed troponin values found to be 0.204 ± 0.026, 34% suffered with AWMI diagnosed troponin values found to be 0.312 ± 0.046, 10.9% suffered with IWMI diagnosed troponin values found to be 0.382 ± 0.014. Based on our results the maximum number of young patients with ACS had low risk levels of Cardiac marker Troponin.

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.**[50]**

Studies of prescription patterns have been extensively carried out and continue to be undertaken in a variety of healthcare settings. Drug usage patterns can be better understood with the help of such research. One of the most efficient ways to learn how doctors are approaching prescriptions is through a prescription-based survey.

In our study, among 147 young acute coronary syndrome patients, 144 (97.9%) were prescribed with Anti platelets, 146 (99.3%) prescribed with Anti coagulants, 147 (100%) were prescribed with HMG-CoA reductase inhibitors, 147 (100%) were prescribed with Proton pump inhibitors, 42 (28.5%) were prescribed with Beta blockers, 20 (13.6%) were prescribed with Diuretics & 6 (4.08%) were prescribed with Vasodilators. Antithrombotic medicines, beta-blockers, ACE-inhibitors/angiotensin receptor blockers, and lipid-lowering pharmaceuticals all had respective prescription rates of 91%, 58%, 50%, and 63%, according to a study by Jorg Muntwyler *et al*. A lot more lipid-lowering medicines were prescribed in this trial than in the previous one.**[65]**

In a previous study by Tasneem Sandozi and Fouzia Nausheen, the drug utilisation of various antiplatelet medicines was as follows: aspirin alone 25.71%, aspirin & clopidogrel 60%[12], but in the current study, the prescription rate of aspirin and clopidogrel was 100%. In the current study, more patients were prescribed aspirin and clopidogrel together than in the prior study. All patients with myocardial infarction, according to the Indian Medical Association's guidelines, should undergo dual antiplatelet therapy. Another study suggested that the combination of aspirin and clopidogrel would be more beneficial than either medicine alone in treating ischemic heart disease brought on by hypertension and diabetes.

Supratim Datta found that, among people with coronary artery disease, ACEIs (42.3%), calcium channel blockers (73%), and beta blockers (37.2%) were the most often used anti-hypertensives. 59 According to research by Jorg Muntwyler *et al*.,[65] beta-blockers have a 58% prescription rate, whereas ACE-inhibitors and angiotensin receptor blockers have a 50% one. Here are the anti-hypertensive medications that were used in the current study: Nearly 40% of people took beta-blockers, and 31% took ARBs. Previous research suggested widespread usage of calcium channel blockers; this study, however, demonstrated that beta-blockers were the more frequently prescribed anti-hypertensives.

Diuretics such as torsemide and spironolactone, among others, were prescribed to a total of 29.93%

of patients. There were some minor discrepancies between this study and one by N. Sujana Priya *et al*. [66]

CONCLUSION

ACS is a worldwide problem, which is observed in many countries. Among the 147 patients diagnosed with ACS, 112 (76.2%) were found to be males. This indicates the gender male are more in the study site. It is concluded that the ACS patients are found more in age group of 41-44 years in our study site (santhiram general hospital, nandyal). NSEMI patients are more when compared with AWMI & IWMI patients. The young patients with ACS are most complaining about chest pain, SOB & sweating. More number of Young ACS patients have risk factor/Cause as smoking. The drugs like Anti-platelet drugs, anticoagulants, fibrinolytics, anti-anginals, anti-hypertensives, anti-hyperlipidemics, antidiabetics, antibiotics, miscellaneous drugs are most prescribed drugs for the betterment of the patient and the other drugs (Diuretics & Vasodilators) are also prescribed for the symptomatic relief.

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