

A Study on Clinical Profile, Risk Factors, Angiographic Profile and Short-Term Mortality of Acute Coronary Syndrome in Smokers vs Non Smokers

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Abstract

Background: Smoking has long been positively associated with the development and progression of coronary heart disease. However, longitudinal cohort studies evaluating smoking habits among cardiac patients as well as the role of socio-demographic factors determining such behaviours are scarce and have been focused on primary care practice. Prevalence of acute coronary syndrome in young individuals is increasing progressively. Previous studies have focused on the analysis of risk factors and to some extent coronary angiographic profile in smokers vs non-smokers patients with acute coronary syndrome. The aim of the study is to study the acute coronary syndrome in smokers versus non-smokers and to analyse with respect to baseline characteristics. **Subjects and Methods:** It was a prospective study conducted at Department of Cardiology, Katuri Medical College & Hospital Guntur. **Results:** In the present study, Acute coronary syndrome occurred seven years earlier in smokers compared with non-smokers ($p < 0.05$) Smokers were frequently male subjects compared with non-smokers ($p < 0.001$) Smokers had a lower prevalence of Diabetes compared with non-smokers ($p < 0.001$) Smokers had a higher prevalence of Obesity compared with non-smokers ($p < 0.001$). Smokers presented with more acute infarctions and less Unstable angina compared with non-smokers ($P < 0.001$). **Conclusion:** In the present study, significant differences were observed in coronary risk factor profile between smokers and non-smokers patients with STEMI and NSTEMI/UA. Larger studies will be required to establish specific associations between presentation of acute coronary syndromes and angiographic profiles in smokers.

Keywords: Acute coronary syndrome, Coronary Angiography, Coronary Artery Disease (CAD), Smokers

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Introduction

Ischemic heart disease is a major public health problem associated with high morbidity and mortality. Acute coronary syndrome is a common presentation of ischemic heart disease.^[1] It is also the single largest cause of death in developed countries as well as developing countries.^[2] Despite being identified as a major burden on health-care systems, there have been no large prospective cohort studies to define the incidence of coronary artery disease (CAD) among Indians. Therefore, the magnitude of the problem can only be estimated from cross-sectional point prevalence studies.^[3] Reports have shown that risk of CAD among Asian Indians is 3–4 times higher than white Americans, 6 times higher than Chinese, and 20 times higher than Japanese counterparts.^[4] A conservative estimate indicates that there could be 30 million

CAD patients in India. If the current trend continues, the burden of CAD in India will surpass other regions of the world by the year 2020.^[5]

In addition to higher rate, it is also reported that Indian individuals may develop CAD at a very early age.^[6] According to an estimate, more than half of death related to cardiovascular disease occurs in patients below the age of 50 years and one-fourth of acute myocardial infarction cases are being reported in patients under the age of 40 years.^[6] It has also been noted that the clinical presentation, risk factor profile, and coronary anatomy of young patients who develop CAD differs to those who develops CAD at an older age (1, 6, & 7). Overall, these studies have indicated that patients with early onset of CAD exhibit preponderance of single vessel disease, and dominance of coronary risk factors such

as hypercholesterolemia, family history of CAD, and cigarette smoking as compared to older patients. However, there have been very limited data on comparison of demographic and angiographic characteristics in smokers stratified according to the type of acute coronary syndrome.

Therefore, we aimed to identify the differences between risk factor profile and coronary angiographic characteristics of smokers and non smokers patients presenting with ST-elevated myocardial infarction (STEMI), and non-ST-elevated myocardial infarction (NSTEMI), with respect to baseline characteristics.

Subjects and Methods

Inclusion criteria

1. Patients with first episode of ACS (Unstable Angina with ECG changes, NSTEMI,STEMI) attending the ICCU, Department of Cardiology, Katuri Medical College, Guntur.
2. Different types of ACS were diagnosed according to ECG criteria and Troponin T positivity.
3. Both Smokers and non Smokers were included in the study group.
4. Smoking history (all forms-tobacco chewing / khaini / beedi / tambaku / cigars.
5. Troponin positivity (qualitative for NSTEMI differentiating from USA with ECG changes.
6. Coronary angiogram was done after 5 days of Heparin therapy in acute coronary syndrome.

Exclusion criteria

1. Age<18yrs/>80yr.
2. Patients with recurrent episode of ACS and Cardiogenic shock.
3. Patients with Valvular heart diseases/ cardiomyopathies/ pericardial diseases/ conduction diseases other than ischemia.
4. Contradictions' to CAG (pts with serum creatinine >1.5mg/dl,lack of consent for CAG) and prior coronary angiogram report.

Unstable Angina Without Ecg Changes

The various baseline characteristics studied include, age and sex of the patients, presentation of the Acute coronary syndrome(Unstable angina with ECG changes versus acute myocardial infarction{acute STEMI+acute NSTEMI) ,presence of traditional risk factors like hypertension, diabetes, smoking history, obesity, family history of CAD in smokers and compared with non smokers.

The following baseline characteristics were studied:

1. Age and sex of the study group.
2. Risk factors
 - Hypertension: $\geq 140/90$ mm Hg/on anti hypertensive medication
 - Diabetes: fasting plasma glucose ≥ 126 mg/dl, 2 hr post prandial glucose ≥ 200 mg/ dl, Symptoms of DM and random plasma glucose concentration ≥ 200 mg/dl, Patients on treatment for diabetes mellitus.
 - Smoking: all forms of smoking-calculated Smoking index with pack years, Current or past smokers (those who have quit within the past six months).
 - Family history: CAD in first degree male relatives before the age 55 and in a first degree female relative before the age 65 years.
 - BMI: The BMI is calculated by dividing the body weight in kilograms by the square of the height in meters. Patients with BMI of 25–29.9 were considered to be overweight and those with BMI >30.0 were considered as obese.

Echocardiography:

All the echocardiograms were done on a IE 133 phillips echocardiography machine. The echocardiography parameters evaluated included:

- Ejection fraction as impaired LV function (EF<50% or normal (EF>/50%).
- Coronary angiograms were performed with SIEMENS CATH LAB on all the patients within 5 to 7 days after ACS /Primary PTCA done in the case of eligible patients. Informed consent was taken from all the patients.

Statistical analyses

Statistical Analysis was done using SPSS software. Mean, median, standard deviation and Chi Squares were calculated wherever applicable. A value of $p < 0.05$ was considered statistically significant.

Results

Distribution of the study subjects:

Table 1: Study subjects

Smokers	Non smokers	Total
108(51.9%)	100(48.1%)	208(100%)

Study group consisted of 208 subjects, of which 108 (51.9%) subjects were smokers including all forms of tobacco use and 100 (48.1%) subjects were non smokers as a control group.

Table 2: Mean age in the study group

Variables	Total	Mean age (years)	P value
Smokers	108	53.52	P<0.05
Non smokers	100	59.48	

Mean age in the smokers group was 53.52 years and Mean age in the non smokers group was 59.48 years. Statistically significant (p<0.05) difference was seen in the mean age between smokers and non smokers who presented with first episode of Acute coronary syndrome. The smokers presented with acute coronary syndrome approximately 7 years earlier than non smokers.

Table 3: Sex distribution of the study subjects

Variables	Smokers	Non smokers	P value
Males	80 (74.1%)	39 (39%)	-
Females	28 (25.9%)	61 (61%)	-
Total	108 (100%)	100 (100%)	P<0.001

Out of 108 study subjects in the smokers, 80 (74.1%) were males and 28 (25.9%) were females. Out of 100 study subjects in the non smokers, 61 (61%) were females and 39 (39%) were males.

In the smokers group, Acute coronary syndrome was more frequently encountered in males (74.1% versus 39%,p<0.001)where as in the non smokers group, Acute coronary syndrome was often encountered in females (61% versus 28%).

Distribution of Risk Factors in the study subjects

Table 4: Prevalence of Diabetes mellitus in the study subjects.

*DM	Smokers	Non smokers	P value
Absent	82 (76%)	56 (56%)	<0.005
Present	26 (24%)	44 (44%)	
Total	108 (100%)	100 (100%)	

*DM: Diabetes mellitus

Out of 108 study subjects in the smokers, Diabetes mellitus was present in 26 (24%) subjects. Out of 100 study subjects in the non smokers, Diabetes mellitus was present in 44 (44%) subjects.

Diabetes mellitus was less commonly encountered in the smokers group (24% versus 44%, p<0.005, statistically significant) when compared to the non smokers group.

Table 5: Prevalence of Hypertension in the study subjects:

*HTN	Smokers	Non smokers	P value
Present	56 (51.9%)	60 (60%)	-
Absent	52 (48.1%)	40 (40%)	-
Total	108 (100%)	100 (100%)	0.167 (**NS)

*HTN: Hypertension, **NS: Non significant

Out of 108 study subjects in the smokers, Hypertension was present in 56(51.9%) subjects. Out of 100 study subjects in the non smokers, Hypertension was present in 60 (60%) subjects.

Hypertension was commonly encountered in both study groups (51.9% versus 60%, p>0.05, statistically non significant).

Table 6: Prevalence of Overweight/Obesity in the study subjects

Overweight/C	Smokers	Non smokers	P value
Absent	34 (31.5%)	67 (67%)	-
Present	74 (68.5%)	33 (33%)	-
Total	108 (100%)	100 (100%)	P<0.001

Out of 108 study subjects in the smokers group, Overweight/Obesity was present in 74(68.5%) subjects. Out of 100 study subjects in the non smokers, Overweight/ Obesity was present in 33(33%) subjects.

Overweight/Obesity was often encountered in the smokers group (68.5% versus 33%,p<0.001, statistically significant) when compared to the non smokers group.

Table 7: Prevalence of the family history of Coronary Artery disease in study subjects

Family H/o *CAD	Smokers	Non smokers	P value
Absent	87 (80.6%)	74 (74%)	-
Present	21 (19.4%)	25 (25%)	-
Total	108 (100%)	100 (100%)	0.351(**NS)

*CAD: Coronary artery disease; **NS:Non significant.

Out of 108 study subjects in the smokers group, family history of CAD was present in 21(19.4%) subjects. Out of 100 study subjects in the non smokers group, family history of CAD was present in 25(25%) subjects.

Family history of CAD was less commonly and equally distributed in both study groups (19.4% versus 25%,p>0.05,statistically non significant).

Table 8: Prevalence of combined Hypertension and Diabetes mellitus in the study subjects

*DM+**HTN	Smokers	Non smokers	P value
Absent	90 (83.3%)	77 (77%)	
Present	18 (16.7%)	23 (23%)	
Total	108 (100%)	100 (100%)	0.349 (***NS)

*DM (Diabetes mellitus); **HTN(Hypertension); ***NS(Non significant).

Out of 108 study subjects in the smokers group, combined DM and HTN was present in 18 (16.7%) subjects. Out of 100 study subjects in the non smoker group, combined DM and HTN was present in 23 (23%) subjects.

Combined DM and HTN was less commonly and equally distributed in both study groups (16.7% versus 23%, $p>0.05$, statistically non significant).

Table 9: Prevalence of combined Hypertension and Diabetes mellitus with Overweight/Obesity in the study subjects

*DM+**HTN	Smokers	Non smokers	P value
Absent	97 (89.8%)	86 (86%)	-
Present	11 (10.2%)	14 (14%)	-
Total	108 (100%)	100 (100%)	0.398 (***NS)

*DM (Diabetes mellitus); **HTN(Hypertension); ***NS(Non significant).

Out of 108 study subjects in the smokers group, combined DM and HTN with Obesity was present in 11(10.2%) subjects. Out of 100 study subjects in the non smoker group, combined DM and HTN with Obesity was present in 14 (14%) subjects. Combined DM and HTN with Obesity was less commonly and equally distributed in both study groups (10.2% versus 14%, $p>0.05$, statistically non significant).

Table 10: Diagnosis of Acute coronary syndrome in the study subjects at time of presentation.

Type of ACS	Smokers	Non smokers	P value
Acute *MI	94 (87.1%)	70 (70%)	<0.001
**UA	14 (12.9%)	30 (30%)	<0.001
Total	108 (100%)	100 (100%)	-

*MI (Myocardial infarction); **UA (Unstable angina)

Acute myocardial infarction (STEMI+NSTEMI) was the most common presentation in both smokers (87.1%) and non smokers (70%). But Acute myocardial infarction, as the initial presentation, was often encountered in smokers when compared to non smokers (87.1% versus 70%, $p<0.001$, statistically sig-

nificant). Unstable angina was often encountered as initial presentation in Non smokers when compared to Smokers (30% versus 12.9%, $p<0.001$, statistically significant).

Discussion

The present study determines the demographic characteristics and angiographic extent of coronary artery lesions in smokers and non smokers having acute coronary syndrome, with comparative analysis focusing on patients presented with STEMI vs. NSTEMI/UA.

In the present study, the majority of patients in the smoking group were males (74.1%) when compared to females but majority of patients in the non smoking group were females (61%). The mean age of the patients in the smoking group was 53.52 years and in the non smokers, mean age was 59.48 years. In the present study, smoking reduced the age at which the first coronary event occurred by approximately seven years.

Majority of the study subjects reached ICCU with acute myocardial infarction as acute coronary event but unstable angina with ECG changes was often encountered in the non smokers group. The smokers had a greater prevalence of infarction and less unstable angina, probably related to younger age and due to the procoagulant effect of tobacco.

In smokers, anterior wall STEMI (44.1%) was the most common presentation followed by acute inferior wall STEMI (34.3%).

A stronger association was seen between smoking and obesity and a weaker one with Diabetes mellitus. Diabetes mellitus was more common in the non smoker group. Hypertension had no association with smoking.

Diabetic status had a significant impact on morbidity & mortality of the patients with ACS in our study. Patients with diabetes and first time detected diabetes had more number of patients in advanced Killip class (Killip class 3 -32.3% and 20.6% resp.) compared to patients with normal blood sugar (8.6%).

Smokers had a relatively greater number of associated risk factors than non smokers. The smokers had more obesity than non smokers.

Majority of the patients (74.1%) in the study group had EF >50% with mean EF was 55.56%.

The prevalence of hypertension in our ACS patients was 75%. This is higher as compared with INTERHEART study (31%). 44% were diabetics. It is higher as compared to INTERHEART, however near to other Indian studies.^[7,8] By 2025, the number of diabetics in India is projected to surpass 57.2 million. Diabetics have endothelial dysfunction, dyslipidemia, chronic inflammatory state which is responsible

for increased atherosclerosis. Smoking was present as risk factor in 65% of the cohort.

Smoking was also most common modifiable risk factor in INTERHEART. BMI more than 30 was seen in 6.5 % of patients which is less as compared with INTERHEART (44%), which may be due to different criteria used in INTERHEART (waist hip ratio). Dyslipidemia was present in 60% of the cohort, however no significant relationship could be found between levels of various lipid parameters and CAD severity on angiography. Single-vessel disease was most prevalent across all ACS group followed by double-vessel and triple vessel which is similar to other studies.^[9,10]

Conclusion

Larger studies will be required to establish specific associations between presentation of acute coronary syndromes and angiographic profiles in young patients. We strongly believe that such information may be of significant value for the prevention and management of cardiovascular disorders considering that acute coronary syndrome itself is an uncommon occurrence in younger patients. Overall, we encourage the recommendation of healthy lifestyles, particularly avoidance of smoking/tobacco consumption. STEMI was most common presentation. LAD was most commonly involved vessel. Males predominated in our ACS population. Hypertension and Smoking were most prevalent risk factors. Diabetics had more aggressive disease with higher morbidity and mortality as compared to non diabetics.

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