



STUDY OF THE ANGIOGRAPHIC PROFILE OF ACUTE CORONARY SYNDROME IN SMOKERS COMPARED WITH NON SMOKERS

Cardiology

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ABSTRACT

Cigarette smoking is a major modifiable risk factor for CVD. 313 patients with first episode of ACS (UA with ECG change, NSTEMI and STEMI) were prospectively studied to assess demographic profile, risk profile and angiography profile in smoker versus non-smoker. Subjects with age less than 40 years were more in the smoker than non-smoker subgroup ($p < 0.05$). Smokers were predominately male ($p < 0.001$). Smokers had a lower prevalence of hypertension compared with non-smokers ($p < 0.001$). Smokers presented with more acute infarctions and less UA compared with non-smokers ($P < 0.001$). Anterior wall STEMI was the most common presentation among smokers ($P < 0.05$). Single vessel disease was the most common CAG diagnosis in both smokers and non-smokers.

KEYWORDS

STEMI ST elevation myocardial infarction, UA unstable angina, NSTEMI non ST elevation myocardial infarction, CVD Cardiovascular disease.

INTRODUCTION

Cardiovascular diseases (CVD) have become one of the leading cause of mortality in India. 1/4th of mortality is attributable to CVD¹. Ischemic heart disease and stroke are the predominant causes and are responsible for >80% of CVD deaths. The Global Burden of Disease study estimate of age-standardized CVD death rate of 272 per 100 000 population in India is higher than the global average of 235 per 100 000 population².

Cigarette smoking is a major modifiable risk factor for CVD, including CAD, stroke, peripheral vascular disease, and congestive heart failure^{3,4}. Patients with Coronary Heart Disease (CHD) under-go diagnostic coronary angiography for evaluation and detection of site and severity of lesions and according to the findings appropriate treatment such as angioplasty, bypass surgery, etc. are done.

MATERIAL AND METHODS

It is a prospective observational study which was carried out in the cardiology department SCBMCH, Cuttack, Odisha. 313 patients with first episode of ACS were included in the study.

INCLUSION CRITERIA:

1. Patients with first episode of ACS (UA with ECG changes, NSTEMI, STEMI)
2. ACS were diagnosed according to ECG criteria and Troponin T positivity
3. Both Smokers (current & former) and Non-Smokers were included in the study group.
4. Troponin positivity (qualitative or quantitative) for NSTEMI differentiating from UA with ECG changes.

EXCLUSION CRITERIA:

1. Age <18yrs or >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. Contraindication to CAG (Serum Creatinine > 1.5 mg/dl, lack of consent), prior CAG
5. Patients using smokeless tobacco.

STATISTICAL ANALYSES:

Statistical Analysis was done using SPSS software (version 25). Mean,

median, standard deviation and Chi Squares were calculated wherever applicable. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Total 313 patients were studied. 247 were male and 66 were female. Baseline characteristics of the patients are described in **Table 1**.

TABLE 1- Socio-demographic characteristics and risk factors

VARIABLE	SMOKER(%)	NON-SMOKER(%)	P-VALUE
GENDER			<0.001
MALE	106(97.2)	141(69.1)	
FEMALE	3(2.8)	63(30.9)	
AGE			<0.05
<40 YR	21(19.3)	18(8.8)	
40-60 YR	37(33.9)	78(38.2)	
>60 YR	51(46.8)	108(52.9)	
COMORBIDITIES			
DM	37(33.9)	87(42.6)	>0.05
HTN	41(37.6)	111(54.4)	<0.005
DYSLIPIDEMIA	60(29.4)	41(37.6)	>0.05
OBESITY	38(34.9)	78(38.2)	>0.05
FAMILY HISTORY	14(12.8)	39(19.1)	>0.05

74.8% of total subjects presented with STEMI/NSTEMI and 25.2% presented with UA. Greater percentage of smoker subjects presented as STEMI/NSTEMI in contrast to non-smoker (88.1% vs 67.6%). The percentage of subjects presenting as UA was greater in the non-smoker group when compared to smoker group (32.4% vs 11.9%). All these differences were statistically significant ($P < 0.001$).

40.6% of all the study subjects presented with anterior wall myocardial infarction. 47.7% of smoker subject and 36.8% of non-smoker subject had anterior wall myocardial infarction and this difference was statistically significant ($P < 0.05$). 46.3% patient out of total study population presented with IWMI/RVMI/PWMI. True posterior wall myocardial infarction was present in 3% of subjects. Greater percentage of subjects in non-smoker arm presented with IWMI/RVMI/PWMI compared to smokers and this difference was statistically significant (54.4% vs 31.2%, $P < 0.001$). 13.8% subjects in smoker group and 8.8% subjects in non-smoker group had lateral wall

myocardial infarction at presentation. The difference between group was statistically non-significant ($P > 0.05$).

SVD, DVD and TVD distribution between smokers and non-smokers were as follows SVD 39.9% versus 38.2%, DVD 37.6% versus 35.3% and TVD 22.5% versus 26.5%. None of these values were statistically significant. Presence of LMCA lesion amongst smoker and non-smoker subject was statistically non-significant distribution. The LMCA lesion was present in 11% smoker subject compared to 10.3% non-smoker subject.

In the smoker group 47.7% subjects had EF $\geq 50\%$ where as 52.3% subjects had EF $< 50\%$. In the non-smoker group 36.8% had EF $\geq 50\%$ and rest 63.2% had EF $< 50\%$. The difference was statistically significant ($P < 0.05$).

DISCUSSION

In this study, we illustrated how smokers and non-smokers undergoing CAG represented two distinct subgroups with specific socio-demographic profiles and co-morbidity patterns, with smokers at significantly higher risk of acquiring CAD and having the worse heart condition. This has implications for any interventions providing follow-up care for these patients.

Smoking was an important risk factor for ACS in younger subjects (age < 40 yrs.). In this group 53.8% of subjects were a smoker vs 46.2 % non-smokers ($P < 0.005$). There were no female smoker in age group < 40 years. Absolute number of smokers was more in age groups of 40-60 years and > 60 years.

In the study male constituted 79% of study population and 21% was constituted by female. Only 3 females gave history of smoking and rest were non-smokers. If we take the subjects who smoked 97.8% were male smokers and 2.2% were female smokers. According to Global Adult Tobacco Survey (GATS) 2016-17 19.0% of men, 2.0% of women and 10.7% (99.5 million) of all adults currently smoke tobacco in India. In this study the number of females smoking tobacco was close to the national average.

Diabetes was more common among non-smokers though it was statistically non-significant (42.6% vs 33.9%, $p = 0.134$). Hypertension was present in 48.6% total study population. There were significantly more number of hypertensive patients among the non-smokers compared to the smokers (54.4% vs 37.6 %, $P < 0.05$). Dyslipidaemia was higher among non-smokers compared to smokers though it was statistically non-significant. (37.6% vs 29.4%, $p > 0.05$). Obesity too didn't have statistically significant association in this study. Obesity was present in 34.9% smokers compared to 38.2 % of non-smokers ($p > 0.05$). Family history of CAD was present in 12.8% of Smokers compared to 19.1% of non-smokers ($p > 0.05$).

PRESENTATION AS STEMI/NSTEMI/UNSTABLE ANGINA – 96 (88.1%) smoker subjects presented as STEMI/NSTEMI at admission . 13 (11.9%) smoker subjects presented as UA. In the non-smoker group 138 (67.6%) presented as STEMI / NSTEMI and 66 (32.4%) presented as unstable angina. The difference was statistically significant ($P < 0.005$).

LOCALISATION OF MYOCARDIAL INFARCTION - 47.7% of smokers presented with anterior wall myocardial infarction which was statistically significant compared to non-smokers 36.8% ($P < 0.005$). The non-smokers mainly presented with inferior wall $\pm$ posterior wall myocardial infarction (54.4% versus 31.2%, $P < 0.001$). 13.8% smokers and 8.8% non-smokers presented with lateral wall myocardial infarction ($P > 0.05$).

NUMBER OF CORONARY ARTERIES INVOLVED - Single vessel disease was involved in 39.9% smokers compared to 37.6% non-smokers. Double vessel disease was seen in 37.6% smokers and 35.3% of non-smokers and Triple vessel disease was seen in 22.5% smokers versus 26.5% non-smokers. LMCA was involved in 11% of smokers and 10.3% non-smokers. None of these values were statistically significant. ($P > 0.05$). There was no significant difference between males and females with respect to number of vessels involved in study population. LAD was the artery predominantly involved in smokers (49%). In the smokers RCA was involved in 36% cases and LCX was involved in 15% cases. Among the involved coronaries , discrete lesion were predominantly seen when compared to long

diffuse lesions in each of individual vessels in the smoker group compared to non-smokers. There was no statistical significance of difference with respect to proximal LAD involvement between smokers and non-smokers.

EJECTION FRACTION – In this study 47.7% smokers and 36.8% of non-smokers had ejection fraction $\geq 50\%$. We also found that 52.2% smokers and 63.2% non-smokers had ejection fraction less than 50%. The difference was statistically significant ($P < 0.05$).

Previous studies show similar findings. In a study done in India by Kumar GR et al¹, in the smokers group, ACS was more frequently encountered in males (74.1% versus 39%, $p < 0.001$). In non-smokers group, ACS was often encountered in females (61% versus 28%). Diabetes mellitus was less commonly encountered in the smokers group (24% versus 44%, $p < 0.005$, statistically significant). Hypertension was commonly encountered in both study groups (51.9% versus 60%, $p > 0.05$, statistically non-significant). Smokers group, Overweight/Obesity was present in 68.5% subjects. In Nonsmoker group, Overweight/Obesity was present in 33% 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). 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 (87.1% versus 70%, $p < 0.001$, statistically significant). Unstable angina was often encountered as initial presentation in Nonsmokers (30% versus 12.9%, $p < 0.001$, statistically significant). SVD was the most common CAG diagnosis in both the smokers and non-smokers (45.3% versus 51%, $p > 0.1$, Non-significant). DVD, even though not statistically significant, was more commonly encountered in smokers (26.8% versus 18%, $p > 0.1$, Not significant). In smokers group, LMCA stenosis was present in 7.4% subjects, compared to 10% subjects in non-smoker group (statistically no-difference). 25.9% had LV dysfunction with EF $< 50\%$ by echocardiography. 74.1% had normal LV function. 44.4% patients presented with Anterior wall STEMI which was the most common presentation of ACS in Smokers followed by inferior wall MI (34.3%). Only 1.9% patients were presented with high lateral / true posterior wall STEMI.

In a similar cross-sectional study was done by Chaudhary SR et al¹⁴³ comparing difference between coronary angiographic profile between smokers and non-smokers in Bangladesh over the course of 2012. Total of 7203 patients underwent CAG were studied. There were 1052 (15%) smokers and 6151 (85%) non-smoker. There were 1025 (97.4%) male smoker compared to 27 (2.6%) female smoker ($P < 0.001$). In the non-smoker group there were 4531 (73.7%) male and 1620 (26.3%) female. In smoking group 269 (25.6%) were above below the age of 60 and 783 were equal to or above the age of 60. In the non-smoker group 1930 (31.4%) were below age of 60 and 4218 (68.6%) were more than or equal to age of 60. There are more number of hypertensive patients in the non-smoker group compared to smoker group (55.8% versus 45.4%, $P < 0.001$). Diabetes was also significantly more in non-smoker group compared to smoker group (33.2% vs 24.5%, $P < 0.001$). Obesity was seen in 3.7% in smoker group compared to 1.6% and non-smoker group ($P < 0.001$). Dyslipidaemia was found in 9.8% in smoker group compared to 4.8% in non-smokers group ($P < 0.001$). 88.2% in smoker group presented with CAD in contrast to 77.2% patient in non-smoker group ($P < 0.001$). In smoker group 33.5% presented with SVD, 26.9% with DVD and 21.6% with TVD ($P > 0.05$). In the non-smoker group 29.3% presented with SVD, 27.1% presented with DVD and 24.2% presented with TVD.

CONCLUSION

Smoking is associated with substantial CVD burden and reduction in life expectancy in both men and women. All types of CVD were associated with smoking. In absolute terms, smoking caused more CVD events amongst men, older age groups and diabetics. Rather than reducing intake, the only safe option in terms of CVD risk was to stop smoking.

Undergoing a CAG at a health care facilities is an opportunity for linking patients to follow-up lifestyle counselling and care. Our results provide an indication of types and volumes of patient would benefit from such care. Since smokers represent a distinct population among the patients undergoing a CAG, it is recommended that such counselling is tailored to smoking status of patients.

LIMITATIONS

Limitations were the non-standardisation of diagnosis, the absence of detailed information on tobacco usage (quantity of smoking, non-smoking tobacco use etc.) . There were very less number of females in the smoker group which could have affected the result of the study.

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