

# Risk Factors and Demographic profile in Acute Myocardial Infarction: A Prospective Study from Tertiary Care Rural Hospital in North India

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## ABSTRACT

**Introduction:** Atherosclerosis is a multi-factorial disease involving the interplay of genetic and environmental factors. Cardiovascular disease (CVD) is rising in low income countries. Studies conducted to assess the prevalence of cardiovascular risk factors among different regions of the country show variation in different age groups of urban and rural population. Current research aimed to study the conventional risk factors in patients of acute myocardial infarction (AMI) presenting in a rural tertiary care hospital in Northern India.

**Material and Methods:** In this cross sectional prospective study, 100 consecutive subjects of first episode of myocardial infarction were enrolled. All patients enrolled in the study were assessed clinically and detailed history with special emphasis on conventional risk factors was taken. Patients were also subjected to investigations like serial electrocardiogram, Echocardiography and biochemical test. Stress evaluation was done using the pre-validated stress scoring system. Physical activity scoring was done with the help of physical activity index.

**Results:** In this study, male comprised of 72% from study population, while, 70% of patients belong to rural population. 46% of study subjects were either labor or farmer by occupation. 34% and 66% of the subjects were less than 45 years and more than 45 years of age respectively. Mean age 54.64 (range: 35-85 years). Smoking (66%) was the commonest conventional risk factor to be present in our study population followed by sedentary lifestyle (50%) and excessive alcohol (44%). Hypertension (HTN) and diabetes mellitus were 28% and 22% respectively. Stress did not appear to be a significant contributor of CAD in our population. The mean high density lipoprotein (HDL) was lower in our study population 35.1 mg/dl  $\pm$  SD 9.3 (range: 14-55). On univariate analysis, risk factor such as smoking and alcohol was found to be significantly more in younger population (<45 years) as compared to elderly population. When risk factor profile of rural and urban population was compared, no significant difference in the risk factors was found, indicating equal risk of coronary artery disease (CAD) for both rural and urban subjects except lower value of low density lipoprotein (LDL) cholesterol was seen in urban population ( $p < 0.01$ ). 80% of study population had 5 or >5 conventional risk factors.

**Conclusion:** We conclude, smoking, sedentary lifestyle, uncontrolled diabetes and low HDL levels were the most common conventional risk factors found in the study population especially in younger age group. The present study highlights the need of a better designed, large population based case-control study so as to identify, which amongst the conventional modifiable risk factor is independently responsible for AMI and also highlights the immediate need to initiate measures to raise awareness about control of diabetes, smoking cessation and exercise among the general population especially younger adults.

**Key Words:** Risk Factors, Acute Myocardial Infarction, AMI, Ischemic Heart Disease, IHD, Coronary Artery Disease (CAD), North India.

## INTRODUCTION

Non-communicable diseases (NCDs), have a multifactorial etiology and account for 70 percent of the deaths globally. Of these, most of the deaths are due to cardiovascular diseases (17.7 million people yearly) followed by cancers (8.8 million), pulmonary diseases (3.9 million), and diabetes mellitus (1.6 million)<sup>1</sup>. Cardiovascular diseases act as a burden over the economy and will supposedly lead to approximately \$47 trillion loss to the economy in the upcoming 20 years<sup>2</sup>. In India, out of all deaths nearly 24.8% deaths are due to cardiovascular diseases as estimated by Global Burden of Disease study (2010). Average age-standardized death rate in India due to cardiovascular disease is 272 per 100000 population which is much higher than rate of global deaths i.e. 235 per 100000 population<sup>3</sup>. A 111% rise in deaths due to cardiovascular diseases in India has been predicted, by 2020<sup>4</sup>. While comparing rural and urban studies on cardiovascular diseases from India, coronary artery disease prevalence is higher in the urban population (11%) relative to rural population (7%)<sup>5-16</sup>. Coronary Artery Disease (CAD) prevalence has increased from 1% (1960) to 9.6% (1995) of urban population; however, it has doubled in the last decade<sup>9,11,15-21</sup>. In 2016, American Heart Association (AHA) update showed that in United States of America around 15.5 million people of  $\geq 20$  years of age, suffer from Coronary Heart Disease (CHD)<sup>22,23</sup> estimating that after every 42 seconds, there will be AMI to an American. There was an increasing prevalence reported for both women and men with age. Out of all the syndromes of CAD the in-hospital deaths due to Acute Myocardial Infarction (AMI) decreased from 10%

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to 6% in past decade<sup>24</sup>. This decline in the age-standardized death rate is mainly due to shift of age demographics, while there is a rise in overall number of deaths from cardiovascular disease since 1990<sup>25</sup>. The risk factors for the cardiovascular diseases are well known and have been classified according to the BETHESDA Classification<sup>26</sup>. Prevention of these documented risk factors may thus help in reducing the burden of disease. This requires strategies globally to increase the knowledge of risk factors amongst various geographic regions and different ethnic groups. Currently, awareness of risk factors and the protective measures are primarily derived from studies performed over entire populations of European origin. As there is a huge variation of diet in different parts of the world, therefore researchers are unsure, if their results are appropriate somewhere else. Same holds true for other risk factors too, for e.g. rise of blood pressure may be an important risk factor for Chinese population but not for others, similarly absence of dyslipidaemia in south Asians might not be much important. This variation among these risk factors occur between different ethnic groups and geographical area depend upon the traditions and practices prevailing in that particular region or area.

In the present study we tried to assess the prevalence of the traditional risk factors in the population presenting in a rural tertiary care hospital of northern India. We also intended to compare the traditional risk factors from those which have been documented worldwide and the rest of India. This would help us in better understanding of risk factors in north Indian rural population thus, will help in better implementation of the preventive strategies.

## MATERIAL AND METHODS

After appropriated Ethical approval from institutional ethical committee, a cross sectional prospective study was conducted in a rural tertiary care hospital of northern India on willing to participate patients, with first episode of Acute Myocardial Infarction (AMI) presenting in the emergency department of Medicine. All patients who presented in emergency with history of acute onset chest pain, were screened for AMI by electrocardiogram (ECG). Patients with the clinical diagnosis of AMI as diagnosed by the clinician considering the clinical, ECG findings and biochemical profile as per the American Heart Association diagnostic criteria's were considered for the study. First hundred consecutive patients fulfilling the required inclusion and exclusion criterions, presenting in one unit were enrolled in the study.

All patients enrolled in the study were assessed clinically and detailed history with special emphasis on risk factors like cigarette smoking, hypertension, diabetes mellitus, dyslipidaemia, physical inactivity, obesity, psychosocial factor, diet and alcohol intake was taken according to the performa by the investigator. All patients were subjected to detailed examination and data was entered in a Microsoft excel sheet. Patients were also subjected to investigations like serial ECG, 2D ECHO, lipid profile, fasting and post prandial blood glucose levels, chest X-rays and complete haemogram. Apart from traditional risk factors we also

tried to assess the role of stress as contributing factor using the pre-validated stress scoring system. Physical activity scoring was done with the help of physical activity index. Patient with previous history of myocardial infarction, hospitalization for cerebrovascular accident or on any lipid lowering medications during the past 6 months were excluded. Pregnant females with AMI, AMI in a hospitalized patient or AMI in patients with recent surgery were also excluded apart for unwilling patients or in whom complete clinical and biochemical data could not be obtained. The following stratification was done for the risk factors

Patient was considered to be a mild to moderate smoker if he had history of smoking for less than or equal to 10 pack years, however history of smoking for more than 10 pack years was considered to be a heavy smoker.

Hypertension was diagnosed on the basis of Joint National Committee 8 classification. For each patient, history of hypertension was taken and the duration for the same was noted. Compliance to medication was also enquired. Blood pressure on presentation was noted.

History of diabetes with respect to the duration, drugs and compliance to the medication was noted in all patients. For all patients fasting and post meal blood sugars were obtained Diabetes Mellitus was identified according to American Diabetic Association Criteria i.e. Fasting plasma glucose levels were  $\geq 126$ mg/dl and 2 - hrs plasma glucose levels  $\geq 200$ mg/dl or Random plasma glucose  $\geq 200$ mg/dl.

Dyslipidemia was considered as a risk factor if the fasting lipid profile showed serum Triglycerides  $>150$ mg/dl, LDL  $> 100$ mg/dl, Total Cholesterol  $> 200$ mg/dl and HDL Men  $< 40$ mg/dl and Women  $< 50$ mg/dl.

Physical activity scoring was done to rule out physical inactivity by multiplying intensity, duration and frequency of physical activity with the help of physical activity index. According to the scores obtained the activity was categorized into sedentary, mild, moderate and strenuous activity. Further the occupation of the subjects was also noted and categorized into housewife, laborer, farmer, auto driver, serviceman, businessman or retired people. The profession also indicated the level of activity in these subjects.

Obesity as a risk factor was considered a risk factor if the waist circumference in men was more than 102cms (40inches), whereas for women was more than 88cms (35inches). The obesity was further classified on the basis of BMI. BMI of less than  $22.9$ Kg/m<sup>2</sup> was considered as normal and  $> 25$ kg/m<sup>2</sup> was considered to be obese as per the revised national consensus guidelines for India<sup>27</sup>.

Data regarding the type of diet and the amount of alcohol consumption was also recorded. A person was considered to be a moderate drinker if he consumed less than 150ml of alcohol per day, whereas 180ml or more of alcohol consumption was considered to be a heavy drinker.

Stress levels in the study population was assessed using the self-estimated stress scale graded from 0 -10 points, with zero points being no stress, 1- 4 points being mild stress, 5-8 points indicating moderate stress and  $> 8$  points indicated Severe stress. The type of stress was further analyzed and

categorized in to stress at home or work, financial stress and stress due to life events in the past.

S No.	Parameters	Value (n=100)
1	Age ≤ 45 ≥ 46	34 (34%) 66 (66%)
2	Sex Male Female	72 (72%) 28 (28%)
3	Marital status Married Unmarried	98 (98%) 2 (2%)
4	Wall involved Anterior Inferior	66 (66%) 34 (34%)
5	Occupation None Housewife Laborer Farmer Auto driver Service Businessman	18 (18%) 24 (24%) 34 (34%) 12 (12%) 2 (2%) 8 (8%) 2 (2%)
6	Area Rural Urban	70 (70%) 30 (30%)
7	Hypertension Yes No	28 (28%) 72 (72%)
8	Diabetes mellitus Yes No	22 (22%) 78 (78%)
9	Physical inactivity Sedentary (PAI: <20) Not good enough (PAI: 21-39) Acceptable (PAI: 40-59) Active and healthy (PAI: 60-80) Very active lifestyle (PAI: 81-100)	50 (50%) 32 (32%) 18 (18%) 0 (0%) 0 (0%)
10	Diet Vegetarian Non-Vegetarian	56 (56%) 44 (44%)
11	Smoking Yes No	66 (66%) 34 (34%)
12	Alcohol Yes No	44 (44%) 56 (56%)
13	Stress None Mild Moderate Severe	50 (50%) 14 (14%) 24 (24%) 12 (12%)
14	Anemia Yes No	18 (18%) 82 (82%)
15	BMI Normal (<25kg/m <sup>2</sup> ) Overweight/Obese (>25 kg/m <sup>2</sup> )	64 (64%) 36 (36%)

PAI: Physical activity Index, BMI: Body mass Index

**Table-1:** Shows Baseline Characteristics of the study population

## STATISTICAL ANALYSIS

Analysis was done according to the objectives formulated for the study. Statistical package SPSS - 20 was used for analysing data. The data was analysed in terms of frequency, percentage, descriptive statistics i.e. minimum, maximum, mean, standard deviation to summarize empirical information. Inferential statistics, based on laws of probability, which provide means of drawing conclusion about the population from which data was obtained were also calculated. Chi square test was used to associate findings with selected socio-demographic variables as well as risk factors. The level of significance chosen was  $p < 0.05$ .

## RESULTS

We enrolled a total of 100 patients on the basis of inclusion criteria over a period of 2 years. Of the 50 patients enrolled, 72 (72%) were men and 28 (28%) were women. 98% of the study subjects were married. 34% participants were <45 years of age while geriatric population i.e. >65 years of age constituted 28% of the total study population. The mean age of the study population was 54.64 (SD - 12.67) Range: 35-85 years. 70% of the study subjects belong to the rural area whereas 30% were residents of urban area. Of the 100 patients 66 were diagnosed to have anterior wall myocardial infarction whereas 34 had inferior wall myocardial infarction. While studying the baseline characteristics of risk factors, 36% of the patients were obese i.e. having BMI >25 kg/m<sup>2</sup>. It was found that smoking was the most common addiction in 66% of the study subjects followed by alcoholism, which was comparatively less prevalent addiction in 44% of the patients among study population. The study subjects with respect to diet were almost equally divided between vegetarian and

Parameter	Minimum	Maximum	Mean	SD
Age (Years)	35	85	54.64	12.679
DM (Years)	0	10	5.18	3.920
HTN (Years)	1	10	5.14	2.713
SBP (mmHg)	90	190	117.8	15.4
DBP (mmHg)	60	90	74.4	6.4
P (minute)	64	82	72.4	4.5
BMI (Kg/m <sup>2</sup> )	18	35	24.2	3.8
Waist/Hip ratio	0.84	1.2	0.9	0.6
FBS (mg/dl)	68	253	105.3	35.9
TC (mg/dl)	117	250	178.4	35.5
TG (mg/dl)	59	315	143.5	53.8
LDL (mg/dl)	30	180	106.0	36.1
HDL (mg/dl)	14	55	35.1	9.3
VLDL (mg/dl)	10	120	32.1	18.6

SD: Standard deviation; DM: Diabetes mellitus; HTN: Hypertension; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; P: Pulse; BMI: Body mass index; mmHg: millimeters of mercury; Kg/m<sup>2</sup>: kilogram per meter square, FBS-fast-fasting blood glucose; TC-Triglycerides; TG- Total cholesterol; LDL-Low density lipoprotein; HDL-High density lipoprotein; VLDL-very low density lipoprotein.

**Table-2:** Summary of patients' clinical and biochemical characteristics

non-vegetarian i.e. 44 (44%) and 56 (56%) respectively. 28% of the study subjects were hypertensives however only four out of these hypertensive patients had uncontrolled blood pressure on presentation. The mean duration of hypertension in study subjects was 5.14years (SD-2.71); Range: 1year to 10years. Diabetes was a less common risk factor seen in 22% of subjects. However half of them had uncontrolled fasting blood sugars on presentation. The mean duration of diabetes mellitus was 5.1years (SD-3.92); Range: <1year to 10years. When the physical activity was studied, 50% of study subjects had sedentary lifestyle i.e. physical activity index <20. Poor and fair activity was seen in 32% and 18% of the

study subjects respectively. On evaluation as per stress scale mentioned in methodology, 12% felt severe stress, whereas no stress was felt by 50% of study subjects. Mild to moderate stress was seen in 14% and 24% subjects respectively. (Table 1)

The biochemical profile of study subjects showed mean fasting blood sugar levels of 105.3;  $\pm$  SD 35.9 (range: 68-253). No patient had fasting blood sugar levels of >260 mg/dl, indicating a fair control of diabetes in our study population. When lipid profile was studied it was found that mean HDL level including both genders was 35.1 mg/dl;  $\pm$  SD 9.3 (range: 14-55). In spite of majority of patients

Sr No.	Parameters	Age < 45 Yrs (n=34)	Age >45 Yrs (n=66)	p Value
1	Sex Male Female	30 (88.23%) 4 (11.77%)	40 (60.66%) 26 (39.40%)	0.090
2	Wall involvement Anterior Inferior	24 (70.58%) 10 (29.42%)	40 (60.66%) 26 (39.40%)	0.700
3	AREA Rural Urban	24 (70.58%) 10 (29.42%)	46 (69.69%) 20 (30.31%)	0.794
4	Physical inactivity Sedentary (PAI: <20) Not good enough (PAI: 21-39) Acceptable (PAI: 40-59) Active and healthy (PAI; 60-80) Very active lifestyle (PAI: 81-100)	14 (41.17%) 12 (35.30%) 8 (23.53%) 0 (0%) 0 (0%)	38 (57.57%) 20 (30.30%) 8 (12.12%) 0 (0%) 0 (0%)	0.454
5	Diet Vegetarian Non-vegetarian	16 (47.05%) 18 (52.95%)	40 (60.60%) 26 (39.39%)	0.540
6	Smoking Yes No	30 (88.24%) 4 (11.76%)	36 (54.54%) 30 (45.45%)	0.039
7	Alcohol Yes No	24 (70.58%) 10 (29.42%)	20 (30.30%) 46 (69.69%)	<0.001
8	Stress No Mild Moderate Severe	20 (58.82%) 2 (5.88%) 8 (23.53%) 4 (11.77%)	32 (48.48%) 10 (15.15%) 14 (21.21%) 8 (12.12%)	0.791
9	Body Mass Index (BMI) < 25 kg/m <sup>2</sup> > 25 kg/m <sup>2</sup>	14 (41.17%) 20 (58.83%)	44 (66.66%) 22 (33.34%)	0.349
10	Hypertension Yes No	4 (11.76%) 30 (88.24%)	24 (36.36%) 42 (63.63%)	0.133
11	Diabetes mellitus Yes No	8 (23.53%) 26 (76.47%)	14 (21.21%) 52 (78.78%)	0.863
12	Biochemical parameters LDL (>100mg/dl) TG (>150mg/dl) TC (>200mg/dl) HDL (<40mg/dl)	14 (41.17%) 8 (23.53%) 6 (17.64%) 20 (58.82%)	36 (54.54%) 34 (51.51%) 22 (33.33%) 32 (48.48%)	0.37 0.08 0.24 0.48

PAI: Physical activity Index, BMI: Body mass Index, Kg/m<sup>2</sup>: kilogram per meter square, TC-Triglycerides; TG- Total cholesterol; LDL-Low density lipoprotein; HDL-High density lipoprotein; VLDL-very low density lipoprotein

**Table-3:** Comparison of risk factors between young and elderly population:



from rural background without obesity, they still had a low HDL levels which might be responsible for acute coronary syndrome although the mean total cholesterol, triglycerides and LDL levels were within acceptable limits. (Table 2)

Sr No.	Parameters	Rural (n=70)	Urban (n=30)	P Value
1	Sex Male Female	48 (68.57%) 22 (31.42%)	22 (73.33%) 8 (26.66%)	1.000
2	Wall involvement Anterior Inferior	50 (71.42%) 20 (28.57%)	14 (46.66%) 16 (53.33%)	0.177
4	Physical inactivity Sedentary (PAI: <20) Not good enough (PAI: 21-39) Acceptable (PAI: 40-59) Active and healthy (PAI; 60-80) Very active lifestyle (PAI: 81-100)	36 (51.42%) 22 (31.42%) 12 (17.41%) 0 (0%) 0 (0%)	16 (53.33%) 10 (33.33%) 4 (13.33%) 0 (0%) 0 (0%)	0.944
5	Diet Vegetarian Non-vegetarian	36 (51.42%) 34 (48.57%)	20 (66.66%) 10 (33.33%)	0.494
6	Smoking Yes No	50 (71.42%) 20 (28.57%)	16 (53.33%) 14 (46.66%)	0.362
7	Alcohol Yes No	30 (42.85%) 40 (57.14%)	14 (46.66%) 16 (53.33%)	0.950
8	Stress No Mild Moderate Severe	40 (57.14%) 12 (17.41%) 12 (17.41%) 6 (8.57%)	12 (40%) 2 (6.66%) 10 (33.33%) 6 (20%)	0.283
9	Body Mass Index (BMI) <25 kg/m <sup>2</sup> >25 kg/m <sup>2</sup>	46 (65.72%) 24 (34.28%)	18 (60%) 12 (40%)	0.803
10	Hypertension Yes No	20 (28.57%) 50 (71.42%)	8 (26.66%) 22 (73.33%)	0.837
11	Diabetes mellitus Yes No	16 (22.85%) 54 (77.41%)	6 (20%) 24 (80%)	0.882
12	Biochemical parameters LDL (>100mg/dl) TG (>150mg/dl) TC (>200mg/dl) HDL (<40mg/dl)	48 (68.57%) 28 (40%) 18 (25.71%) 34 (48.57%)	2 (6.66%) 12 (40%) 10 (33.33%) 18 (60%)	<0.01 1.0 0.58 0.52

PAI: Physical activity Index, BMI: Body mass Index, Kg/m<sup>2</sup>: kilogram per meter square, TC-Triglycerides; TG- Total cholesterol; LDL-Low density lipoprotein; HDL-High density lipoprotein; VLDL-very low density lipoprotein

**Table-4:** Comparison of risk factors between Rural and Urban study population

Sr. No	Variables	Present Study	Yusuf S. et al	Krishnan M.N. et al	Walia R et al	Sekhri T et al	Steyn K et al
	Reference No.	-	28	29	30	31	32
1	Male Sex (%)	72	75.9	40.10	48	NA	66.6
2	HTN (%)	28	39.02	NA	43.6	21	42.3
3	DM (%)	22	18.45	NA	16.4	16	23.6
4	Physical Inactivity (%)	50	14.27	79.31	60.6	45.6	15.0
5	Smoking (%)	66	65.19	33.42	7.5	11.6	72.3
6	Alcohol (%)	44	24.01	NA	NA	NA	22.2
7	Stress (%)	12	24.0	NA	NA	NA	31.8
8	BMI (%)	64	26.11	33.48	25.4	47.6	27.59

HTN: Hypertension; DM: Diabetes mellitus; BMI: Body mass index; NA: Not available

**Table-5:** Comparison of Demographic profile in different studies

When comparing the modifiable and non-modifiable risk factors between younger (<45 years) and elderly (>45 years) individually in our study population presenting with acute myocardial infarction, it was found that statistically significant difference was seen in prevalence of both smoking and alcohol between the two population ( $p = 0.03$  and  $p = < 0.001$ ) respectively. On univariate analysis there was no significant difference in affection to either anterior or inferior wall myocardial infarction. Both the groups had similar lifestyle with majority of subjects in each group having sedentary lifestyle. 47.17% in young and 57.57% in elderly;  $p = 0.45$ . Even the biochemical profile between the two groups did not show any statistically significant difference. (Table 3)

When comparing the prevalence of risk factors between the rural and urban population, we found no statistically significant difference, indicating that risk factors profile remained same for majority of both populations, further predisposing to CAD equally. (Table 4)

We analysed prevalence of both modifiable and non modifiable risk factors in the study population and it was found that 80% had five or more than five conventional risk factors. When only modifiable risk factors were counted in each individual, 36.5% of individuals had four or more than four out of the nine modifiable risk factors. This indicates that modifiable risk factors play an important role in coronary artery disease

## DISCUSSION

The risk factors for CAD are well known. Investigators continue to propose additional indicators like behavioral, biochemical, environmental, genetic risk markers, to stratify patients into either low or high risk of developing a cardiovascular event i.e. arrhythmias, heart failure, re-infarction and death. Various studies have been carried out by multiple investigators both in India and abroad to document the prevalence of both newer and traditional risk factor for CAD in their local population. However there is no contemporary data available with respect to the rural populations of northern India. In the present study we documented the prevalence of conventional risk factors in the population presenting in a rural tertiary care hospital with first episode of Acute myocardial infarction. We assumed that the patients presenting to the hospital would be mostly from rural background having less of sedentary lifestyle with good eating habits, leading to lesser incidence of dyslipidemia, stress and chronic diseases like diabetes and hypertension, which occurs due to poor and sedentary lifestyle. The study was aimed to help us in better implementation of the preventive strategies among patients of North India.

The demographic profile in our study showed significantly higher percentage of younger population (34%) being affected with CAD as compared to the rural population of central India (9%) as shown in study done by Patil. S. S et al<sup>33</sup>. Similar findings were seen in the prevalence of diabetes between the two study populations (22% vs 9%), however prevalence of hypertension was almost same. This could

be attributed to the dietary, genetic, cultural and life style changes in the northern India as compared to the Central India. This shows a growing and increasing incidence of coronary artery disease in the younger population of northern India. This also showed that awareness and control of diabetes was poor in our study population and thus warranting better implementation of preventive practices and improving awareness about control of diabetes in northern India.

Our study population had 66% smokers and 44% consumed alcohol routinely. 25.2% of the rural population of central India smoked as in study done by Patil S.S et al<sup>33</sup> Smoking was also less predominant (7.5%) in urban population of study subjects in a study done by Walia R et al<sup>30</sup> Krishnan M.N. et al<sup>29</sup> documented 33.42% smokers of which 28% was prevalent in males. This high percentage of smoking as reported in our study could be due to local rural traditions of hookah smoking and majority of study population being from rural area. This significantly higher incidence of smoking in both young and elderly population might be responsible for the higher atherosclerosis and increase incidence of CAD in young. Study by Patil S.S. et al<sup>33</sup> also showed smoking to be an independent risk factor to AMI, associated with a 4 fold increase in risk in all ages. All these findings were similar to many previously done Indian and international studies suggesting tobacco smoking as one of the most important modifiable risk factor for AMI.

Stress was much lower in our rural study population as compared to other studies done in India but was comparable in the urban population. Thus stress did not appear to be a significant contributor of CAD in our population. Lipid profile of our study population when compared with other studies done in India showed that the mean HDL levels in our subjects was  $35.1 \text{ mg/dl} \pm 9.3$  whereas it was  $40.9 \text{ mg/dl} \pm 15.6$  and  $42.46 \text{ mg/dl} \pm 11.5$  in studies done by Patil S.S. et al<sup>33</sup> and Sekhri T. et al<sup>31</sup> in central India. However, the total cholesterol was almost similar to that of other studies done in other parts of India. This difference of low HDL might be an important risk factor predisposing our study population to coronary artery disease. The sedentary lifestyle of our study population (>50%) also supports the presence of low HDL cholesterol. The LDL levels >100 mg/dl was significantly higher in rural population (68.57%) as compared to urban population (6.6%) in our study. However, to identify the exact explanation for this difference, a well-designed larger study is required.

Our study was one of the first study conducted in North India comparing both the rural and urban patients of AMI. We enrolled consecutive patients and we were able to capture complete data from all the participants with no missing variables. However, one of the limitations of our study was a smaller sample size and unavailability of age and sex-matched controls from general population.

## CONCLUSION

From the above study we conclude, smoking, sedentary lifestyle and low HDL levels were the most common conventional risk factors found in the study population

especially in younger age group. Stress did not contribute significantly. There was no statistically significant difference in risk factors between rural and urban population. Large case-control studies with multivariate logistic regression are needed to stratify, which conventional risk factor independently contributes the most in occurrence of coronary artery disease (CAD). The present study highlights the immediate need to initiate measures to raise awareness about the risk factors especially tobacco smoking, control of diabetes and obesity among the general population especially young adults. Initiative at individual and Government level are required to develop programs to control smoking especially amongst youth.

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