Study of Risk Factors for Acute Myocardial Infarction in Western Maharashtra : A Case-Control Study

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Abstract:

Introduction: Myocardial infarction (MI) is one of the leading causes of mortality in India. The associated risk factors vary with respect to geographical and cultural difference in patients of MI. **Objective:** To study the association between known risk factors and MI in patients visiting tertiary rural health care center. **Method:** The study design was Unmatched Case Control type. Patients of age 18 or above diagnosed of AMI were included as cases. Patients of age 18 or above without prior history of heart disease were included as controls. Pregnant women and patients with coexisting cardiogenic shock, any significant chronic medical illness was excluded. The history of hypertension, Diabetes, family history of CHD, stress in past 1 year, history of alcohol intake, History of tobacco addiction, type of activity at work were recorded. The comparison of case and controls were done using Chi square test, Fisher's Exact Test and Odds ratio, wherever applicable. An one sided "p" value of <0.05 was considered significant. **Results:** Of the 230 study participants included in the study, 100(43.5 %) were cases and 130 (56.5%) were Control, respectively. Except for history of stress, there was no statistical difference between number of cases and controls. **Conclusion:** The known risk factors of MI were not found associated with the disease. There is a need for conduct of study with larger sample size for confirmation of the study results.

Keywords : Myocardial infarction, Psychological, Risk factors, Smokeless, Smoking, Stress, Tobacco

Introduction:

Cardiovascular diseases are the one of the important causes of morbidity and mortality all over the world.[1] In 2012, the UN gave a red flag to the alarming increase in non-communicable diseases, as an important hurdle in sustainable development in the 21st century, in low and middle-income countries. [2]

Individuals of Indian origin are at a higher risk of developing Ischaemic Heart Disease (IHD) [3,4] when compared with other ethnic groups,[5,6] the cause of which remains unclear. The occurrence of conventional risk factors like tobacco addiction, hypertensive disorder and elevated cholesterol levels in Indians is comparable with other ethnic groups. [3,7-10] The proposed risk factors of IHD in Indian population, owing to its high prevalence, are elevated triglycerides, reduced HDL, insulin resistance and high visceral fat.[3,4,8,9,11] Although, these may not necessarily be associated with development of IHD and vice versa. Moreover, previous studies were conducted on migrants, whose findings may not essentially be applicable to the those residing in India. Therefore, a hospital-based case control study

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of patients with a Myocardial Infarction in Rural Maharashtra, India, was planned to assess the relative importance of the risk factors for IHD.

Method:

The study design was Unmatched Case Control type and patients newly diagnosed with Myocardial Infarction admitted in Pravara Rural Hospital, Loni were the study population. The sample size of study was 230. In a study by Zodpey S P, [12] considering the probability of exposure of smoking among cases (0.68) and controls (0.56) with confidence level of 95% and 80% as power of test, the calculated sample size for cases and controls was 100 and 130 respectively.[13,14] Being a hospital based study, the patients were selected by purposive sampling. The smokers of all smoking indices were grouped together for the ease of calculation.

Patients of age 18 or above diagnosed of AMI (clinical symptoms, ECG changes, and raised enzyme levels) and admitted in Pravara Rural Hospital, Loni, willing to participate in the study were included as cases. Patients of age 18 or above without prior history of heart disease or exertional chest pain admitted in Pravara Rural Hospital, Loni, willing to participate in the study were included as controls. Pregnant women and patients with coexisting cardiogenic shock, any significant chronic medical illness (e.g., untreated hyper or hypothyroidism, renal disease, or malignancy) were excluded from both case and controls.

The study was initiated after ethical approval. The informed consent was taken before inclusion of study participants. Their demographic profile was recorded. The history of hypertension, Diabetes, family history of CHD, stress in past 1 year, history of alcohol intake was recorded. History of passive smoking (spouse regularly smoking in subject's presence or subject is exposed to smoke at workplace), past history of tobacco smoking, Smokeless Tobacco quantity frequency Index (taking into account number of tobacco chews or dips in a day), [15] Smoking Index, [16] type of activity at work [17] and total serum cholesterol were recorded. The comparison of case and controls were done using Chi square test, Fisher's Exact Test and Odds ratio, wherever applicable. An one sided "p" value of <0.05 was considered significant.

Results:

Of the 230 study participants included in the study, 100 (43.5 %) were cases and 130 (56.5%) were Control, respectively. In the present study, the age of cases was significantly higher as compared to that of controls (p=0.0010, Mann-Whitney Test). (Figure 1)

The male and female proportion in the cases and controls was comparable (p= 0.5215, Fisher's Exact Test). Similarly, there was no statistical difference between cases and controls with respect to number of patients with family history of coronary heart disease (p=0.288, Fisher's Exact test), History of tobacco addiction (p= 0.125), History of Passive Smoking (p=0.09) and Past history of tobacco addiction (p=0.14). (Table 1)

There was no statistically significant difference in number of patients of case and controls with respect to severity in smokeless tobacco frequency index (p=0.8691, Chi square test), tobacco smoking index (p=0.8769), activity at work (p=0.0884) and total cholesterol (p=0.0718), respectively. (Table 2)

There was no statistically significant increase in odds of risk factors i.e., History of Alcohol Intake, Family History of Coronary Heart Disease, Tobacco Addiction, Gender, Total Cholesterol, History of Stress, History of Passive Smoking and Past history of tobacco smoking. (Table 3)

Figure 1: Comparison of mean age of Cases and Controls

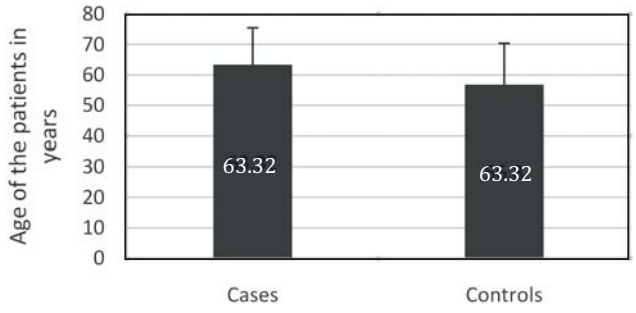

Table 1: Risk factors of the study participants

Variables	Cases (n=100)	Controls (n=130)	Total (n=230)	p value
Gender				
Female	41(41%)	54(41.5%)	95(41.3%)	0.5215
Male	59(59%)	76(58.5%)	135(58.7%)	
Family History of Coronary Heart Disease				
Absent	93 (93%)	117 (90%)	210(91.3%)	0.2888
Present	7 (7%)	13 (10%)	20(8.69%)	
History of Stress				
Absent	60 (60%)	94 (72.3%)	154(66.95%)	0.0341*
Present	40 (40%)	36 (27.7%)	76(33.04%)	
History of Tobacco Addiction				
Yes	60(60%)	67(51.53%)	127(55.2%)	0.1259
No	40(40%)	63(48.46%)	103(44.8%)	
History of Passive Smoking				
No	88(88%)	122(93.84%)	210(91.3%)	0.0933
Yes	12(12%)	8(6.15%)	20(8.69%)	
Past history of tobacco smoking [current smokers (29) were not included in the count]				
No	80(90.90%)	108(95.58%)	188(93.53%)	0.1481
Yes	8(9.09%)	5(4.42%)	13(6.46%)	
Total	88 (43.7%)	113 (56.2%)	201 (100%)	
History of Alcohol Intake				
No	85(85%)	97(74.61%)	182(79.13%)	0.0383*
Yes	15(15%)	33(25.38%)	48(20.86%)	

*Statistically significant (p<0.05), Fisher's Exact Test

Discussion:

In the present study, the age of cases (63.32±12.23 years) was significantly higher as compared to that of controls (56.8±13.61 years). Therefore, the patients of cases and controls were not age matched. Similar finding was observed in a study by Oliveria. [18]

The male and female proportion in the cases and controls was comparable (p= 0.5215, Fisher's Exact Test). Similarly, there was no statistical difference between cases and controls with respect to number of patients with family history of coronary heart disease (p=0.288, Fisher's Exact test), History of tobacco addiction (p= 0.125), History of Passive Smoking (p=0.09) and Past history of tobacco addiction (p=0.14). In previous studies conducted in India, tobacco addiction, hypertensive disorder and elevated cholesterol levels were associated with MI.[3,7-10] In a cohort study done in 5 villages by Kaur P et al, Hypertension and diabetes were associated with MI, while smokeless tobacco use was not associated with MI. However, among males, smoking and hypertension were associated with MI, while

Table 2: Tobacco indices and activity at work of the study participants

Variable	Cases (n=100)	Controls (n=130)	Total (n=230)	p value
Smokeless Tobacco Frequency Index				
≤3chews/dips per day (DPD)	73 (73%)	98 (75.4%)	171(74.34%)	0.8691*
4–6 DPD	18 (18%)	20 (15.4%)	38(16.52%)	
>6 DPD	9 (9%)	12 (9.2%)	21(9.13)	
Tobacco Smoking Index				
Non-smoker	88(88%)	113(86.92%)	201(87.39%)	0.8769*
Smoking Index <100	5(5%)	9(6.92%)	14(6.08%)	
Smoking Index 100-300	6(6%)	6(4.61%)	12(5.21%)	
Smoking Index >300	1(1%)	2(1.53%)	3(1.3%)	
Activity at work				
Heavy physical work	38(38%)	53(40.76%)	91(39.56%)	0.0884*
Mainly walking, climbing stairs	11(11%)	21(16.15%)	32(13.91%)	
Walking uphill, lifting heavy objects	5(5%)	12(9.23%)	17(7.39%)	
Predominantly walking on one level, no heavy lifting	44(44%)	37(28.46%)	81(35.21%)	
Mainly sedentary Subject does not work at all	2(2%)	7(5.38%)	9(3.9%)	
Total Cholesterol				
Within normal range (< 200mg/dl)	64(64%)	96(73.84%)	160(69.56%)	0.0718**
Raised	36(36%)	34(26.15%)	70(30.43%)	

*Chi-square Test($\chi 2$), **Fisher's Exact Test

alcohol consumption and diabetes were not associated with MI.[19] In the study by Oliveria,[18] statistically higher number of cases had the history of Dyslipidemia, Hypertension, Diabetes, history of alcohol intake and Family history of myocardial infarction.

The number of patients with history of stress in preceding year was significantly higher among cases with respect to controls (p=0.034). On the contrary, the number of patients with history of alcohol addiction were significantly higher among controls as compared to cases. Ilic M et al[20] found association between Stressful event with MI.

There was no statistically significant difference in number of patients of case and controls with respect to severity in smokeless tobacco frequency index (p=0.8691, Chi squared test), tobacco smoking index (p=0.8769), activity at work (p=0.0884) and total cholesterol (p=0.0718), respectively.

There was no statistically significant increase in odds of risk factors i.e., History of Alcohol Intake, Family History of Coronary Heart Disease, Tobacco Addiction, Gender, Total Cholesterol, History of Stress, History of Passive Smoking and Past history of tobacco smoking. In a study by Johnsen et al, no association was found between occupational physical activity and risk of MI.[21]

Table 3: Odds values for risk factors of Myocardial Infarction

Variables	Odds Value	95% Confidence Interval
History of Alcohol Intake	1.928	0.9802-3.792
Family History of Coronary Heart Disease	1.476	0.5660-3.850
Tobacco Addiction	1.41	0.8321-2.391
Gender	0.978	0.5758-1.661
Total Cholesterol	0.6296	0.3576-1.108
History of Stress	0.5745	0.3299-1.000
History of Passive Smoking	0.4809	0.1886-1.226
Past history of tobacco smoking	0.463	0.1459-1.469

In a study by Chomistek et al., high amount of alcohol intake, diabetes, hypertension and Hypercholesterolemia are associated with higher occurrence of Myocardial infarction.[22] Ilic M found association between Diabetes, Hypertension, Hypercholesterolemia, Stressful event, Family history of MI, smoking and binge drinking with MI.[20] A study conducted in the Netherlands on patients aged 65–70 years concluded that even houseworker cycling reduces the risk of coronary events and death from coronary heart disease.[23] Attard R et al. reported association between smoking, regular alcohol drinking, history of diabetes, hypertension, hypercholesterolemia with MI.[24]

To summarize, the known risk factors for MI, except history of resent stressful event, were not found significant in comparison with the controls. Sixty-one patients (47%) in the controls group were diagnosed with Cerebrovascular Accident (CVA), Alcoholic Liver Disease, Hypertension or Uncontrolled DM. The risk factors i.e., tobacco addiction, alcohol intake and hypercholesterolemia are common among MI and these diseases. This might be the reason for insignificant results found in the present study. A study with larger sample size may be required to confirm the findings of present study.

However, the number of patients with stress among cases was significantly higher as compared to controls.

Limitations of the Study:

Owing to time restricted student project, the calculated sample size could not be achieved. The present study was hospital based; purposive sampling was opted. The cases and controls were not age and gender matched. The presence of CVA, Alcoholic Liver Disease, Hypertension or Uncontrolled DM in the controls acted as confounding factors in the study.

Conclusion:

History of stress in the preceding year was associated with increased risk of Myocardial Infarction. However, history of alcoholic intake was associated with decreased risk of MI. There was no statistically significant association between the known risk factors and occurrence of MI. there is a need for conduct of study with larger sample size for confirmation of the study results.

Declaration:

Funding: Nil

Conflict of Interest: Nil

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