

Epidemiological Study of Risk Factors in Myocardial Infarction Patients

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ABSTRACT

Introduction: Recent ecological study for major CVD risk factors and mortality indicates a high correlation between expected and observed mortality rates for three major risk factors- hypertension, diabetes, smoking. Survivor of MI are at higher risk of recurrent infarction than in people who don't have coronary heart disease. **Objectives:** To evaluate the risk factors of Myocardial Infarction among cardiac patients and provide patient education in order to minimize risk factors. **Methods:** A prospective and observational study was conducted on 500 medical records of cardiac department. Data was collected by using a case report form from September 2019 to December 2019 and then analyzed using statistical package for social science (SPSS) version 20.0 software. **Results:** We have assessed around 500 myocardial infarction cases, Out of which higher proportion of risk factors in myocardial infarction patients has been observed in Coronary Artery Disease (31%), Hypertension (20.9%), followed by Diabetes Mellitus (15.01%), Smoking (12.5%), Alcohol consumption (12.3%), Obesity (3.09%) and any co-

existing diseases (4.75%). **Conclusion:** On the whole, this study indicates that evaluation of risk factors provides new scope for the development of more effective approaches to prevent the recurrent chances of myocardial infarction by providing patient education and life style modification.

Key words: Hypertension, Myocardial Infarction, Patient education, Risk factors.

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INTRODUCTION

Epidemiological study on myocardial infarction

WHO and Global burden of disease study mainly focuses on increasing trends in the years of life lost and disability adjusted life years from coronary heart disease in India.

In India, studies have reported aggravating Coronary Heart Disease (CHD) prevalence over past 60 years from <1% to 4%-6% in rural population and 1% to 9%- 10% in urban population.¹ The most popular form of coronary heart disease is myocardial infarction and is responsible for over 15% of mortality each year, among vast majority of people undergo Non-ST Elevated Myocardial Infarction (NSTEMI) than ST-Elevated Myocardial Infarction (STEMI). The prevalence of myocardial infarction is extreme in men in all specific age groups than women.²

By the end of 20th century, Cardio Vascular Diseases (CVD) accounted for <10% of all deaths worldwide. At this end, CVD accounted for nearly 50% of the deaths in the developed world and 25% of the deaths in developing world. By 2020, CVD may claim 25 million deaths annually. As this trend spreads to and continues in developing countries, CVD will dominate as major cause of death by 2020, accounting for at least 1 in every 3 death. Two main factors have been attributed to reduce in CVD mortality rates can be therapeutic advances and preventive measures. According to WHO, number of persons with diabetes mellitus varies from 135 million people in 1995 to 300million in 2025, where a 35% raise in worldwide prevalence is seen.³

Statistics on evaluation of risk factors

The funds from US and international studies shows a strong protective association between ideal CV health matrices and clinical, preclinical conditions. Tobacco use can be a leading cause and is estimated to

account for 7.2 million deaths worldwide in 2015 and over past 5 years, there has been sharp increase in cigarette use among adolescents.

Coronary heart disease (43.8 %) is leading cause of death attributable to CVD in US, followed by stroke (16.8 %), hypertension (9.4%), heart failure (9%) and other CVD'S (17.9%).⁴ Among children from 1999 to 2000, 2000 to 2015, prevalence of non-smoking, ideal total cholesterol and ideal blood pressure has been improved. The prevalence of current smoking in US in 2016 was 18.5% for adults, 3.4% of adolescents smoked cigarette in past month. According to NHANES i.e; National Health and Nutrition Exam Survey in 2015-2016 is 39.6% of US adults and 18.5% of youth were obese and 87.7% of adults and 5.6% of youth had severe obesity. So, on basis of NHANES 2013-2016 data for adults with diabetes mellitus, 20.9% had their diabetes mellitus treated but uncontrolled, 9.2% were aware they had diabetes mellitus but were not treated.⁵

A better understanding of the risk factors associated Myocardial Infarction disease would enable. The development of prevention strategies. No previous study, to our knowledge, has reported the common risk factors associated with incidence of myocardial infarction. We therefore sought to identify risk factors for MI, with a particular emphasis on characteristics that are known to be modifiable.

MATERIALS AND METHODS

The study was conducted in the department of cardiology in Malla Reddy Narayana Multi-speciality Hospital, Hyderabad, India and the patients were enrolled in the health survey from 1st July, 2019 to 31st January, 2020. A total of 500 patients were involved in the study where 362 men and 138 women older than 30 years has been evaluated for risk factors of myocardial infarction. Patients were excluded from the current study if

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patient is pediatric, if the patient is pregnant or lactating, if the patient is suffering from drug induced myocardial infarction, if the patient is using recreational drugs (amphetamines, cocaine, LSD). The patients have agreed to participate in the baseline health examination which indicates written informed consent.

Demographic details

Age and sex were self-reported by the patients. Height and Weight was directly measured using a calibrated scale. Blood pressure was measured using a manual sphygmomanometer where the patient was seated in a comfortable position.

ECG reports

Conduction disorders such as lateral wall infarct, anterior wall infarct, inferior wall infarct, posterior wall infarct were manually confirmed for the purposes of the present study.

Laboratory measurements

Blood samples were collected to monitor the levels of serum creatinine, troponin-1, CKMB, CPK, LDH and plasma glucose using standard laboratory techniques.

Cardiovascular comorbidities

Hypertension is observed when the systolic blood pressure is greater than 140 mm Hg, diastolic blood pressure is greater than 90 mm Hg, or any past history of hypertension with the usage of anti-hypertensive medication. In the same way, Diabetes is observed when a fasting glucose level is of at least 200 mg/dL in a single measurement or at least 120 mg/dL in 2 separate measurements or usage of any anti diabetic medication. Myocardial infarction is diagnosed when any two of clinical features are present: a) ischemic chest pain, b) any new abnormal Q waves or ST segment changes c) abnormal elevation in cardiac enzymes.

Habits

Alcohol consumption and cigarette smoking were evaluated by using questionnaires. Patients were classified as occasional smokers, regular smokers, or non-smokers. Patients were also classified based on their amount of alcohol intake as chronic alcoholic, ex-alcoholic or non- alcoholic.

RESULTS

A total of 500 cases were examined for evaluation of risk factors in myocardial infarction patients during the study period, of which 500 cases were enrolled based on Inclusion and Exclusion criteria. There were 138 female patients and 362 male patients enrolled for the study period (Table 1 and Figure 1). Of the enrolled 500 patients, recording the age wise distribution of subjects with class size of 10 years, it was seen that majority of subjects belong to age group of 51-60 years, with mean age value of 50.54 years (Table 2 and Figure 2). Among different types of MI, the most common types are NSTEMI and STEMI where 366 subjects have STEMI and 134 subjects have NSTEMI (Table 3 and Figure 3). Of 500 subjects enrolled in this study, the length of hospitalization was evaluated where most of the subjects (375 cases) stay for 1-3 days followed by 125 cases for 4-6 days (Table 4 and Figure 4). On the whole, this study mainly focuses on evaluation of few easily measured, preventable risk factors like smoking, alcohol, obesity where higher proportion of risk factors in myocardial infarction patients has been observed in Coronary Artery Disease (31%), Hypertension (20.9%), followed by Diabetes Mellitus (15.01%), Smoking (12.5%), Alcohol consumption (12.3%), Obesity (3.09%) and Any co-existing diseases (4.75%) (Table 5 and Figure 5).

Table 1: Gender-wise distribution of patients.

| Gender | Number of cases | Percentage |
|--------|-----------------|------------|
| Female | 138 | 27.6% |
| Male | 362 | 72.4% |
| Total | 500 | 100% |

Table 2: Age-wise distribution of subjects.

| AGE | No of Cases | Percentage |
|-------|-------------|------------|
| 21-30 | 3 | 0.6% |
| 31-40 | 51 | 10.2% |
| 41-50 | 129 | 25.8% |
| 51-60 | 151 | 30.2% |
| 61-70 | 120 | 24% |
| 71-80 | 41 | 8.2% |
| 81-90 | 5 | 1% |
| Total | 500 | 100% |

Table 3: Type of myocardial infarction.

| Type of MI | No of cases | Percentage |
|------------|-------------|------------|
| NSTEMI | 134 | 26.8 |
| STEMI | 366 | 73.2 |
| Total | 500 | 100 |

Table 4: Length of stay among enrolled subjects.

| length of stay | number of cases | Percentage |
|----------------|-----------------|------------|
| 1-3days | 275 | 60 |
| 4-6days | 125 | 25 |
| 7-9days | 65 | 8 |
| 10-12days | 25 | 5 |
| 13-15days | 10 | 2 |

Table 5: Risk factors v/s number of subjects.

| RISK FACTOR | APPERED IN NUMBER OF CASES | Percentage |
|-------------|----------------------------|-------------|
| CAD | 415 | 31.32075472 |
| OTHER | 63 | 4.754716981 |
| SMOKING | 166 | 12.52830189 |
| ALCOHOLIC | 164 | 12.37735849 |
| HTN | 277 | 20.90566038 |
| DM | 199 | 15.01886792 |
| Obesity | 41 | 3.094339623 |
| Total | 1325 | 100 |

The data is analysed using SPSS version 20. Study protocol was prepared and submitted to Human Ethical Committee of Malla Reddy Narayana Multi-speciality Hospital and it has been approved by the Ethics Committee.

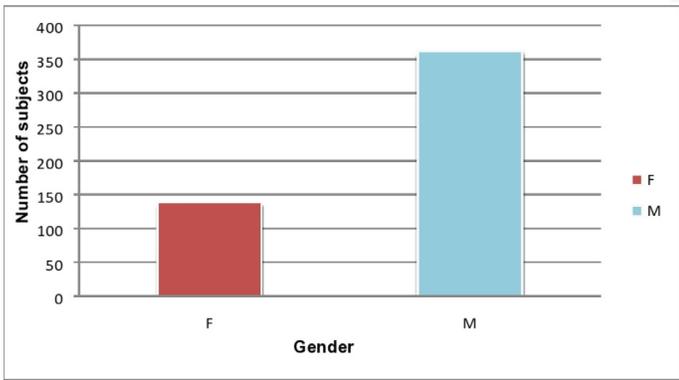


Figure 1: Graphical representation of Gender-wise Distribution.

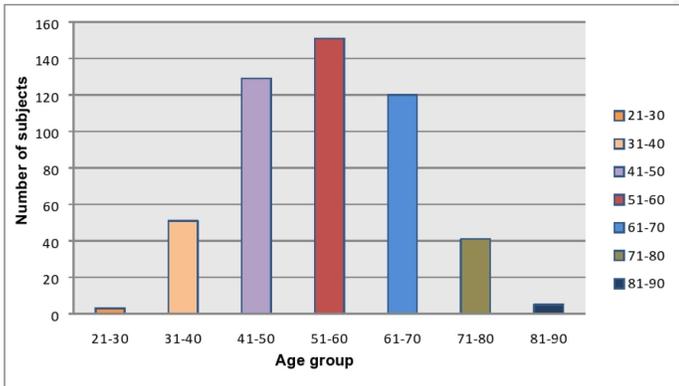


Figure 2: Graphical representation of age- wise distribution.

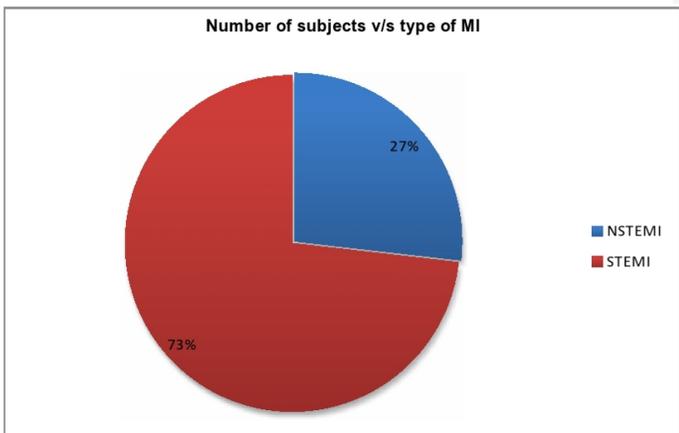


Figure 3: Pictorial representation of type of myocardial infarction among enrolled patients.

DISCUSSION

In this present scenario, there has been no proper evidence which demonstrate the proportion of risk factors among myocardial infarction patients where the reoccurrence chances are higher. Several recent studies on this strategy were retrospective or case-control analysis.

A population based cohort study was conducted by TuomasKerola, on risk factors associated with MI who concludes that the average age of 6146 subjects was 49.2 years of which; 2697 (43.9%) were men and 3449

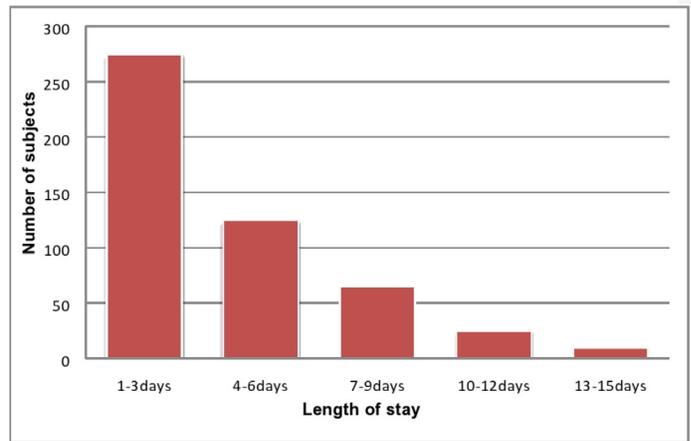


Figure 4: Graphical representation of length of stay among enrolled patients.

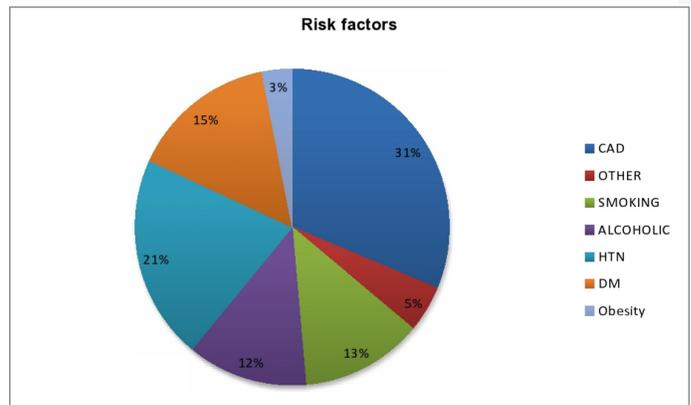


Figure 5: Pictorial representation types of myocardial infarction.

(56.1%) were women,⁶ where our study was carried out on evaluation of risk factors among myocardial infarction inpatients in department of coronary care unit(CCU) in territory care hospital.

There is a need of providing a proper patient education regarding disease and its associated risk factors in order to minimize the recurrent chances of MI. Hence the results also highlight several areas that need improvements. Overall, scope for minimizing risk factor has to be existed. When the patients case sheets were screened thoroughly, it was seen that majority of subjects belong to age group of 51-60 years, with mean age value of 50.54 years of which 138(27.6%) were female patients and 362(72.4%) were male patients.

Joshua Chadwick Jayaraj *et al.* study concludes that the most popular form of coronary heart disease is myocardial infarction and is responsible for over 15% of mortality each year, among vast majority of people undergo Non-ST Elevated Myocardial Infarction (NSTEMI)² than ST-Elevated Myocardial Infarction (STEMI)² where as in our study, we found that most of the cardiac patients were more likely affected with STEMI i.e; 366 subjects (73.2%) when compared to NSTEMI i.e; 134 subjects (26.8%).

Out of 500 subjects included in the study, 166(12.5%) subjects had a social habit of smoking where few are chronic smokers and few are ex-smokers and this report was comparable to Emily Banks *et.al* study, but higher compared to report from Australia during 2006 to 2009. However, Current tobacco smokers have at least double the chances of developing MI. Risks of MI increases with increase in number of

cigarettes smoked per day and were greatly diminished among those quitting smoking.⁷ MI is a serious result of Coronary Artery Disease (CAD) which is seen in higher proportion of 31%. Out of 500 subjects, 415 were exposed to this risk factor and the recurrent chances are higher. The current prospective observational study was carried to evaluate the risk factors of MI patients who are admitted in Coronary Care Unit (CCU) of tertiary care settings. Among different types of modifiable and non-modifiable risk factors, we have analyzed only specific risk factors which are the major causes for MI such as Hypertension, Diabetes Mellitus, Smoking, Alcohol, any co-existing CVDs, Obesity and other comorbid conditions. Smoking and Alcohol are preventable risk factors for this disease. Overweight and obese may affect health and it is necessary to control one's BMI.

Literature was evaluated only on specific individual risk factors, but very small amount in-detail conclusions of such studies were reported by other investigators. In the following study site, it was seen that the highest number of subjects were enrolled for the study belongs to cardiac department. Considering various risk factors, the highest proportion of Coronary Artery Disease was observed followed by hypertension and diabetes.

Providing patient education can also help in minimizing the risk factors, thereby reducing the incidence of myocardial infarction. Based on this study, in the following study period it can be concluded that improving the life style of individual can reduce the recurrent chances of myocardial infarction.

Review articles

1. TuomasKerola *et al.* conducted a population based cohort study of "RISK FACTORS ASSOCIATED WITH ATRIOVENTRICULAR BLOCK" was carried out in the MiniFinland Health Survey, during the period between January 1, 1978, to December 31, 1980 where a total of 7217 older than 30 years of age participated in health examinations. The average age of 6146 subjects was 49.2years of which; 2697 (43.9%) were men and 3449 (56.1%) were women. The characteristics associated with AV block are Older age ($P < .001$), hypertension ($P = .002$) and higher levels of cholesterol ($P < .001$), triglycerides ($P < .001$) and fasting glucose ($P < .001$) were each associated with a higher risk of AV block. On the whole, this study concludes that the modifiable risk factors like an elevated systolic blood pressure and a higher fasting glucose level were independently associated with AV block.⁶
2. Emily Banks *et al.* conducted a prospective study of "TOBACCO SMOKING AND RISK OF 36 CARDIOVASCULAR DISEASE SUBTYPES: FATAL AND NON-FATAL OUTCOMES" in a large prospective Australian study which was carried out from 2006 to 2009 where 267,153 men and women aged 45 were involved in the study. In general, 94.9% ($n = 74,141$) among all current and past smokers reported smoking cigarettes only, 1.8% ($n = 1379$) have been smoking cigarettes and cigars or pipes and 1.8% ($n = 1407$) were smoking only cigars or pipes. The attributable fraction was found much higher at younger in comparison to older ages, being 38.2% in men aged 45–54 decreasing to 9.3% in women aged ≥ 75 years; it was 35.5% for the age group 45–64. Current tobacco smokers have at least double the risk of developing most significant types of CVD, majorly AMI. Risks of CVD increased with increasing numbers of cigarettes smoked per day and were greatly diminished among those quitting smoking.⁷
3. Sidney C *et al.* conducted a population-based control study on "RISK FACTORS FOR MYOCARDIAL INFARCTION IN LATIN AMERICA" where the 9 risk factors for coronary heart disease—abnormal lipid levels, smoking, hypertension, diabetes, abdominal obesity, psychosocial stress, regular physical activity and consumption of fruits, vegetables and alcohol—accounts for 90% or more of the PAR for both men and women worldwide. The PAR for abdominal obesity in the Latin American countries studied was 48.5%, followed by 40.8% for dyslipidemia and 38.4% for smoking. In their study, few major gender differences were noted, where men more likely to smoke than women (54% versus 12%) and women are more likely to have abdominal obesity (35% versus 9%). Intra-abdominal fat has been reported to be independently correlated with the metabolic syndrome, where the patients have twice the risk of developing cardiovascular disease and a 4 times the risk for diabetes.⁸
4. Saif Al-Shamsi *et al.* conducted a retrospective cohort study of "INCIDENCE OF CARDIOVASCULAR DISEASE AND ITS ASSOCIATED RISK FACTORS IN AT-RISK MEN AND WOMEN IN THE UNITED ARAB EMIRATES: A 9- YEAR RETROSPECTIVE COHORT STUDY" at Tawam Hospital, Al-Ain, during the period of April 1, 2008 and December 31, 2008 where 977 subjects are involved. In both males and females, a low eGFR was a significant risk factor for major CVD. The SBP was a strong predictor of major CVD, where the risk increases by 20% and 58% for every 10 mmHg SBP increase in men and women, respectively. The major CVD risk increased by 16% in men and 24% in women for each 1% rise in the HbA1c level. In this study, they have found that the incidence rate of major CVD was majorly in men than in women. Cigarette smoking influences other cardiovascular risk factors, for example, DM and serum lipids and it has a multiplicative association with HTN on incident CVD.⁹

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CONFLICT OF INTEREST

Disclosure, financial and material support: To my knowledge, all of my possible conflicts of interest and those of my coauthors, financial or otherwise, including direct or indirect financial or personal relationships, interests and affiliations, whether or not directly related to the subject of the paper, are listed in the appropriate sections of this manuscript. Disclosure includes, but is not limited to, grants or research funding, employment, affiliations, patents (in preparation, filed, or granted), inventions, speakers' bureaus, honoraria, consultancies, royalties, stock options/ownership, or expert testimony.

ABBREVIATIONS

CCU: Coronary Care Unit; SPSS: Statistical package for social science; NSTEMI: Non-ST Elevated Myocardial Infarction; STEMI: ST-Elevated Myocardial Infarction; CVD: Cardio Vascular Diseases; MI: Myocardial infarction; BMI: Body mass index.

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