# Risk Factors in Patients with Acute ST Elevation Myocardial Infarction; a Survey in a Tertiary Care Government Hospital, NICVD, Karachi, Pakistan

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**Citation**

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**Abstract**

Introduction: ST segment elevation Myocardial Infarction (STEMI) continues to be a significant public health problem in industrialized countries. > 50% of patients with STEMI will die within 24 hours of the onset of ischemia, and many of the survivors will suffer significant morbidity. Modification of risk factors can prevent the development of coronary heart disease (primary prevention) or reduce the risk of experiencing STEMI in patients who have CHD (secondary prevention).

Objective: To determine the frequency of Risk factors in patients with acute STEMI.

Study Design: Descriptive analytical study consisted of 100 patients with acute STEMI, selected for thrombolysis, underwent clinical examination, routine investigations, questionnaire filled, data collected.

Results: Out of 100, 19 were females and 81 were males. Mean age 53 years. 45% hypertensive, 41% smoker, 35% diabetic 33%, dyslipedemic and 14% have positive family history of IHD. The prevalence of risk factor in our study population was 37%.

Conclusions: Identification of major modifiable risk factors for CHD (dyslipidemia, hypertension, smoking, obesity, inactivity, diabetes) is prerequisite to the implementation of preventative and secondary interventions. In our study diabetes, HTN, dyslipidemia and smoking are found to be the major risk factors in patient with acute MI, all are modifiable. Caregivers should control diabetes, blood pressure, lipid profile, and counsel patient for smoking cessation, weight reduction, increasing activity level and eating healthy diet in all patients with established CHD.

## INTRODUCTION

Greater than 50% of patients who experience STEMI will die within 24 hours of the onset of ischemia, and many of the survivors will suffer significant morbidity 5. Clinical trials have demonstrated that modification of risk factors can prevent the development of coronary heart disease (primary prevention) or reduce the risk of experiencing STEMI in patients who have coronary heart disease (secondary prevention) 2. The identification of major modifiable risk factors for CHD (dyslipidemia, hypertension, smoking, obesity, inactivity, and diabetes) is a prerequisite to the implementation of preventative interventions. The importance of identifying people at risk is that many of the important risk factors for cardiovascular disease are modifiable by specific preventive measures.

Objectives:

To find out the frequency of major risk factors in patients with acute ST segment Elevation myocardial infarction.

## PATIENTS AND METHODS

This is a descriptive analytical study, consisted of 100 numbers of patients. Case recruitment done in the Emergency department of National Institute of Cardiovascular Diseases (NICVD), which is the largest, high volume tertiary care public hospital concerning heart diseases placed in the centre of the city, Karachi, Pakistan. Study period: consisted of 6 months (from May 31, 2006 to Dec 1, 2006). Inclusion criteria: Patients of both genders, between the age group of 30-90 years, diagnosed as acute ST-segment elevation myocardial infarction. Exclusion criteria: Patients who developed STEMI after admission were excluded from the study. Questionnaires were filled out during an interview with patients and included these variables; age, address, gender, risk factors, duration of

typical chest pain, pain to needle time, door to needle time, mode of transportation and causes of delayed presentation to hospital like patient ignoring chest pain, assuming chest pain was due to some other problem than cardiac, delay in referring from primary care center, misdiagnosis, traffic block, delay in getting conveyance and others. Data analysis was performed through SPSS version 10. Mean plus minus SD was computed to present age, pain to needle time and door to needle time. Frequency and percentages was computed to present reasons for delay in initiating thrombolytic therapy and risk factors. No statistical test was applicable for this descriptive study.

Operational Definitions

Diabetes mellitus — The following definitions are from American Diabetic Association (ADA) reports 12: Fasting Plasma Glucose at or above 126 mg/dL (7.0 mmol/L), a two-hour value in an OGTT (2-h PG) at or above 200 mg/dL (11.1 mmol/L), or a random (or "casual") plasma glucose concentration ≥ 200 mg/dL (11.1 mmol/L) in the presence of symptoms. The diagnosis of diabetes must be confirmed on a subsequent day by measuring any one of the three criteria. In 2010 revision of the clinical recommendation by ADA included the use of HbA1C to diagnose diabetes with a cut point of ≥ 6.5 percent.

Hypertension — Hypertension is high blood pressure. Blood pressure is the force of blood pushing against the walls of arteries as it flows through them. The following definition have been suggested by the seventh report of the Joint National Committee (JNC 7), which was published in 2003 13.

Hypertension: Stage 1: systolic 140-159 mmHg or diastolic 90-99 mmHg.

Stage2: systolic ≥ 160 or diastolic ≥ 100 mmHg.

Dyslipidemia— Third report of the National Cholesterol Education Program (NCEP) Expert Panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult zZZTreatment Panel III). Circulation 2002 14, included the following values for diagnosing dyslipidemia:

LDL cholesterol, 160 to 189 mg/dL (4.13 to 4.88 mmol/L).
Total cholesterol, >_240 mg/dL (6.20 mmol/L) HDL cholesterol, <40 mg/dL (1.03 mmol/L)

Smoking — It includes inhalation of tobacco through cigarettes, pipe or cigars and includes those patients who even smoke once daily.

Family History — It means family history of ischemic heart disease and includes patients with at least one first degree relative with validated premature cardiovascular disease before age 55 in a male or before age 65 in a female.15

## RESULTS

The Study consisted of 100 patients out of which 19 were females and 81 were males. The mean age was 53yrs (Table-1).

Out of 100 patients, 35% of the patients were diabetic, 45% were hypertensive, 41% of patients were smoker, 33% of them were dyslipedemic although 24% have no record of their lipid level and 14% have positive family history of Ischemic Heart Disease (Table-2). The prevalence of risk factor in our study population was 37%.

**Table 1**

AGE DISTRIBUTION

| | Mean+- Std. Deviation | Median | Minimum | Maximum |
|---|---|---|---|---|
| Age of Patient(Years) | 53.99+_ 12.40 | 52.00 | 30 | 90 |

**Table 2**

FREQUENCY OF RISK FACTORS IN STEMI PATIENTS

| RISK FACTORS | FREQUENCY | PERCENTAGE |
|---|---|---|
| Diabetes | 35 | 35% |
| Hypertension | 45 | 45% |
| Smoking | 41 | 41% |
| Family History | 14 | 14% |
| Dyslipidemic | 33* | 33% |

* 24% of patients had no record of their lipid levels

## DISCUSSION

Ischemic heart disease is the number one cause of death in adults from both low and middle income countries as well as from high-income countries 3. At the turn of the century, it was reported that coronary heart disease mortality was expected to increase approximately 29 percent in women and 48 percent in men in developed countries between 1990 and 2020.4

However, mortality rates for cardiovascular disease and CHD in men and women and in blacks and whites have fallen in most developed countries by 24 to 50 percent since 1975, although the decline has slowed since 1990 5 . This trend has been associated with reductions in both the incidence of CHD and in the case fatality rate and is significant for both sudden and non sudden cardiac deaths 6.The magnitude and causes of the reduction in CHD mortality was evaluated in adults between the ages 25 and 84 in the United States from 1980 to 2000 7. The following observations were made: The age-adjusted death rate for CHD in men and women fell from 543 to 267 and from 263 to 134 per 100,000 populations, respectively. Approximately one-half of this effect was due to improvements in therapy including secondary preventive measures after myocardial infarction or revascularization, initial treatments for acute coronary syndromes, therapy for heart failure, and revascularization for chronic angina. The other half of this effect was due to changes in risk factors, including reductions in total cholesterol (24 percent), systolic blood pressure (20 percent), smoking prevalence (12 percent), and physical inactivity (5 percent). These were somewhat offset by increases in body-mass index and the prevalence of diabetes, which together accounted for an 18 percent increase in the number of deaths.

A report based upon data from three observational studies — the Framingham Heart Study, the Multiple Risk Factor Intervention Trial (MRFIT), and the Chicago Heart Association Detection Project in Industry — included more than 380,000 subjects, 21,000 of whom died of CHD [16] . Major CHD risk factors were defined as total cholesterol ≥ 240 mg/dL (≥ 6.22 mmol/L), systolic blood pressure ≥ 140 mmHg, diastolic blood pressure ≥ 90 mmHg, smoking, and diabetes. Study subjects were stratified by age and gender. Among subjects dying of CHD, exposure to at least one risk factor ranged from 87 percent (for men aged 40 to 59 in the MRFIT trial) to 100 percent (for women aged 18 to 39 in the Framingham Heart Study).16

An important aspect of the evaluation of the patient with documented coronary heart disease is an assessment of risk for subsequent cardiac events. The coronary risk factor profiles of persons with previously unrecognized MI is similar to those of patients whose infarctions are clinically recognized 8. However, risk factors like hypertension and diabetes mellitus, chronic kidney disease are associated with an increased tendency toward unrecognized MIs and termed as CHD risk equivalents.

Hypertension is a well-established risk factor for adverse cardiovascular outcomes 17,18. In the worldwide INTERHEART study of patients from 52 countries, hypertension accounted for 18 percent of the population attributable risk of a first MI 2. Systolic blood pressure is at least as powerful a coronary risk factor as the diastolic blood pressure, particularly in older patients, and isolated systolic hypertension is now established as a major hazard for coronary heart disease and stroke 19. Epidemiologic studies in the general population have shown that the risk of cardiovascular disease increases progressively at blood pressures above 110/75 mmHg However, such epidemiologic observations do not prove causality. Goal blood pressure in such patients is best derived from clinical trials. Data from the HOPE, EUROPA, and CAMELOT trials suggest that reducing the blood pressure below previously recommended goal levels is beneficial in high-risk patients20-22. While HOPE and EUROPA have been interpreted to demonstrate a specific benefit of ACE inhibitors in patients at increased risk, the results of CAMELOT and other data suggest that the benefit of ACE inhibitor therapy in these trials was due to blood pressure

reduction. We suggest a goal blood pressure ≤ 130/80 mmHg in patients with CVD.

Insulin resistance, hyperinsulinemia, and elevated blood glucose are associated with atherosclerotic cardiovascular disease 23-27. In an analysis of over 13,000 participants in the Copenhagen Heart Study, the relative risk of incident of MI or stroke was increased two to three fold in those with type 2 diabetes, and the risk of death was increased two fold, independent of other CHD risk factors 23. In addition, a significant number of patients with an acute MI have previously undiagnosed diabetes 28. In the worldwide INTERHEART study of patients from 52 countries, diabetes accounted for 10 percent of the population attributable risk of a first MI 2. In addition to the importance of diabetes as a risk factor, diabetics have a greater burden of other atherogenic risk factors than nondiabetics, including hypertension, obesity, increased total-to-HDL-cholesterol ratio, hypertriglyceridemia, and elevated plasma fibrinogen. While maintaining tight control of blood sugar in either type 1 or type 2 diabetes has clear benefits on micro vascular complications. Control of blood sugar should be an adjunct not an alternative to control of lipids, blood pressure, and body weight, as well as to increasing levels of physical activity

Lipids, principally cholesterol and triglycerides, are the water insoluble compounds that require larger protein containing complexes called lipoproteins to transport them in blood. The protein components of the lipoprotein are known as apolipoproteins or apoproteins.

Evidence for the pathogenic importance of serum cholesterol has largely come from randomized trials which showed that reductions in total and LDL-cholesterol levels (almost entirely with statins) reduce coronary events and mortality when given for primary and secondary prevention30-31. The following lipid and lipoprotein abnormalities are associated with increased coronary risk: Elevated total cholesterol and elevated LDL-cholesterol, Low HDL-cholesterol, Increased total-to-HDL-cholesterol ratio, Hypertriglyceridemia, Increased non-HDL-cholesterol, Increased Lp(a), Increased apolipoprotein B (apo B; found primarily in LDL) and decreased apolipoprotein A-I (apo A-1; found in HDL), Small dense LDL particles. Different genotypes of apolipoprotein E (apoE) influence cholesterol and triglyceride levels as well as the risk of CHD.

The prevalence of dyslipidemia is increased in patients with premature CHD: as high as 75 to 85 percent compared to approximately 40 to 48 percent in age-matched controls without CHD 33, 34. In the worldwide INTERHEART study of patients from 52 countries, dyslipidemia (defined as a raised apo B to apo A-1 ratio) accounted for 49 percent of the population attributable risk of a first MI 2. Cholesterol lowering, mainly by statins, is effective for the primary prevention of cardiovascular disease, including myocardial infarction, stroke, and cardiovascular death. We recommend following the treatment guidelines according to the Third Report of the Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III, or ATP III) 11. Case-control and prospective cohort studies indicate consistently that individuals who self select for a number of dietary modifications, including a diet high in fruits, vegetables, and fiber (particularly cereal fiber)and low in saturated fats have lower risks of CVD, but this effect is likely to be mitigated by intake of transfatty acids and may also be mitigated if fat is replaced by carbohydrate.

The incidence of an MI is increased sixfold in women and threefold in men who smoke at least 20 cigarettes per day compared to subjects who never smoked.6 In the worldwide INTERHEART study of patients from 52 countries, smoking accounted for 36 percent of the population attributable risk of a first MI.7 The risk of MI increases with tobacco consumption in both men and women and is higher in inhalers compared to noninhalers 19. On the other hand, the risk of recurrent infarction in a study of smokers who had an MI fell by 50 percent within one year of smoking cessation and normalized to that of nonsmokers within two years. All patients should be encouraged to quit smoking.

It is recommended that a brisk walk for 20 minutes, optimally daily, for primary prevention of CVD. Even in the absence of metabolic syndrome, individuals with increased BMI have higher risks of CVD. All adults should be encouraged to achieve and maintain a desirable weight (BMI 18.5 to 24.9 kg/m2) 12.

We support the AHA guidelines for primary prevention which recommend aspirin for all apparently healthy men and women whose 10 year risk of a first CHD event is 10 percent or greater.

## CONCLUSION

Identification and Modification of a number of modifiable risk factors for CHD such as diabetes, dyslipidemia,

hypertension, smoking, obesity, inactivity, whether through therapeutic lifestyle changes alone or drug therapies as adjuncts, is likely to have at least additive benefits in the primary and secondary prevention of cardiovascular disease (CVD).

In our study, like other international studies, diabetes, HTN, dyslipidemia and smoking are found to be the major risk factors in patient with acute MI and all are found to be modifiable.

Caregivers should encourage screening programs specially for individuals who are at high risk for developing Ischemic heart disease which should includes: blood glucose testing, blood pressure monitoring, lipid profile, and counseling for smoking cessation, weight reduction plans, activity level and healthy diet education.

While in patients with established CHD in addition to closely monitoring of above mentioned parameters, caregivers should consider the major drug therapies of proven benefit such as aspirin, statins, and, in patients with myocardial infarction or heart failure, beta blockers and angiotensin converting enzyme (ACE).

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