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Correlation between Myocardial Infarction and Co-Morbidities in a Tertiary Care Hospital of Southern Maharashtra: A Descriptive Analytical Study

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ABSTRACT
BACKGROUND:*Cardiovascular disease (CVD) is the leading cause of mortality and morbidity worldwide and this is largely due to an aging population and increasing exposure to major CVD risk factors, including smoking, hypertension, hypercholesterolemia, physicalinactivity, obesity and diabetes. The growing epidemic of obesity and diabetes are of special concern, being one of the most common non-communicable diseases, and the fourth or fifth leading cause of death in most developed countries.[1]Prevention of CVD and management of established CVD in patients with diabetes are the great challenges faced by clinicians, patients and society.The present study aims at finding the prevalence of diabetes mellitus and other comorbidities in patients presenting with acute myocardial infarction and also an association between clinical parameters of comorbidities such as diabetes mellitus, hypertension, etc. and acute myocardial infarction.*
MATERIALS AND METHODS:*The descriptive analytical study was conducted over a period of 2 years at a tertiary care center of southern Maharashtra. A total of 228 patients were included in the study. The patients were grouped into those with comorbidities such as hypertension, diabetes mellitus and those without any comorbidities. Further evaluation and analysis were done as a descriptive study to find the correlation amongst the variables.*
RESULTS:*The mean age was 62.22 ± 8.95 years in the study. The prevalence of diabetes mellitus in the patients was 21.9 percent and the prevalence of hypertension was 28.9 percent with chest pain (93.9%) being the main presenting complaint.The mean duration of diabetes mellitus in old diabetic patient was 3050 days(8.3 years).*
CONCLUSION:*We found that around one fifth (21.9%) of myocardial infarction patients had Diabetes Mellitus and its other vascular complications in varying proportion and around 28.9% had Hypertension. Both diabetes mellitus and its other vascular complications will increase the overall morbidity and mortality in patients with acute myocardial infarction. A timely diagnosis and adequate treatment of diabetes mellitus is thereby beneficial to the patients in reducing the morbidity and mortality burden.*
KEYWORDS:*CVD, DM, HTN, IHD, CAD, LIPID PROFILE*

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I. INTRODUCTION

The worldwide prevalence of Type-2 Diabetes Mellitus (T2DM) for all age-groups was 2.8% in 2000 and estimated to be 4.4% in 2030.[2]The latest estimates by the international diabetes federation, project that 592 million (1 in 10 persons) worldwide will have DM by 2035.[3]

Tenerz A et al[4] conducted a study entitled 'Myocardial infarction and prevalence of diabetes mellitus: is increased casual blood glucose at admission a reliable criterion for the diagnosis of diabetes? They concluded that one of four patients with acute myocardial infarction had diabetes mellitus.Müdespacher D et al[5] showed that elevated glucose level in acute coronary syndrome patients on admission is a significant independent predictor of in hospital mortality and is even more important for patients who do not have known diabetes.

In addition, studies have reported that several factors including increased oxidative stress, increased coagulability, endothelial dysfunction and autonomic neuropathy are often present in patients with DM and may directly contribute to the development of CVD.[6]Collectively, the high rates of CV risk factors and direct biological effects of diabetes on the CV system place diabetic patients at an increased risk of developing CVD, and contribute to the increased prevalence of MI, Stroke and Congestive Heart Failure.[7]

II. MATERIALS AND METHODS

The descriptive analytical study was conducted over the patients admitted in a tertiary care hospital in Southern Maharashtra and the various parameters were noted and analyzed over an excel sheet format.

Patients' data was included after obtaining an informed consent. Comorbidities such as obesity, hypertension and diabetes mellitus and the subsequent occurrence of myocardial infarction was studied. A total of 228 patients were included in the study over a span of 2 years.

Diagnosis of MI was done as:[8]
Ischaemic symptoms like heavy, squeezing, crushing, stabbing, burning pain in chest and/or epigastrium radiating to arm, abdomen, lower back or jaw.
1. ECG changes like
a. New ST elevation at the J point in two contiguous leads with the cut off points ≥ 0.2 mV in men or ≥0.15 mV in women in leads V2-V3 and /or ≥0.1mV in other leads
b. ST depression and T wave changes. New horizontal or down sloping ST depression ≥0.05mV in two contiguous leads with prominent waves or R/S ratio >1
OR
c. New left bundle branch block (LBBB).
OR
d. Development of pathological Q waves in the ECG
OR
2. Detection of elevated values of cardiac biomarkers (preferably troponin) above the 99thpercentile of the upper reference limit (URL)OR
3. Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality on echocardiogram.
Diagnosis of DM was done as:

WHO criteria[9] for the diagnosis of Diabetes Mellitus:
1. Symptoms of diabetes plus random blood glucose concentration ≥11·1 mmol/L (200 mg/dL). Random is defined as any time of day withoutregard to time since last meal
OR
2. Fasting plasma glucose ≥7·0 mmol/L(126mg/dL). Fasting is defined as no caloric intake for at least 8 hours
OR
3. Two-hour plasma glucose ≥11·1 mmol/L(200 mg/dL) during an oral glucose tolerance test.

The test was performed as described by WHO using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water. The classic symptoms of diabetes mellitus include polyuria, polydipsia, and unexplained weight loss.

III. RESULTS

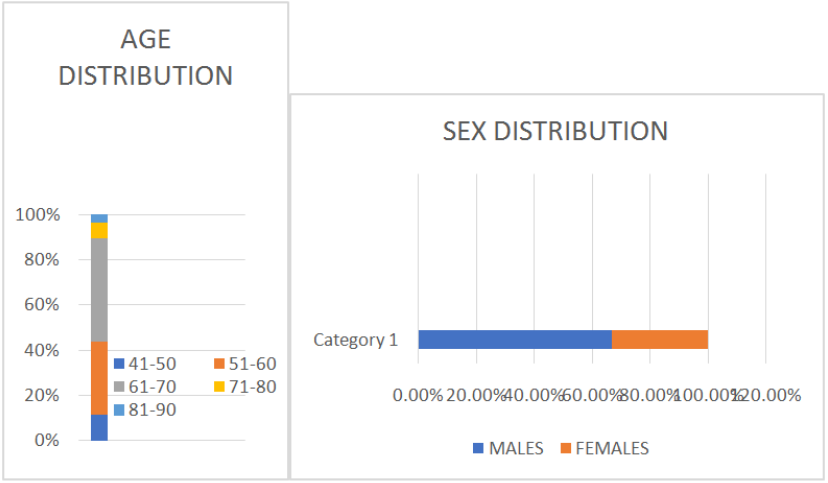


Figure 1 and 2 showing AGE and SEX Distribution of patients.

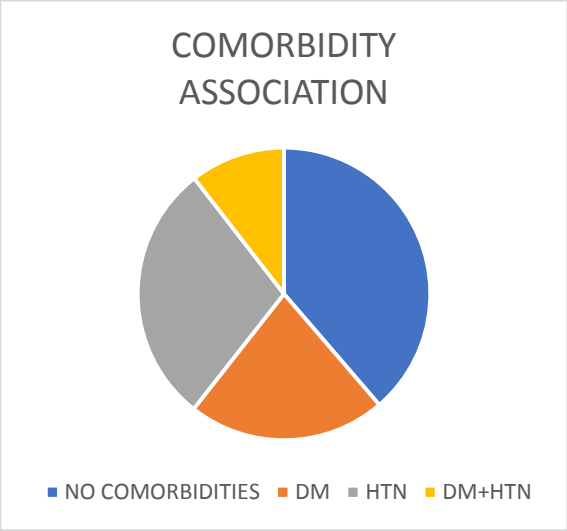
Of 228 patients included in the study, 66.7% (152) were males and 33.3% (76) being females.

Maximum patients were in the age group of 61-70 years (104 patients) followed by 74 patients in the age group of 51-60 years.

Chest pain as an initial presenting complaint was present in 93.9% of patients. The second most common presenting complaint was shortness of breath followed by palpitations. (Depicted in Table 1)

TABLE 1 – Presenting Complaints of patients.

Complaints	Yes n (%)
Chest pain	93.9%
Shortness of breath	41.2%
Palpitations	24.6%
Syncope	7.9%
Giddiness/Vomiting	12.3%
Pedal oedema	0%



Diabetes Mellitus as an associated comorbidity was seen in 21.9% of patients(n=50)
Hypertension was associated in 28.9% of cases (n=66)
both diabetes mellitus and hypertension were seen in 10.5% (n=24) of cases.

Figure 3 – Associated Co-Morbidities.

Type of diabetic patient	Frequency	Percent
Newly detected T2DM	16	32.0
Old T2DM patients	34	68.0
Total	50	100.0

Table 2 – Duration of DM

68% of the diabetic patients had DM since beginning and the remaining 32% were newly diagnosed cases as depicted in Table 2.

Type of hypertensive patient	Frequency	Percent
Newly detected HTN	10	15
Old HTN patients	56	85
Total	66	100.0

Table 3 – Duration of HTN

85% of the diabetic patients had HTN since beginning and the remaining 15% were newly diagnosed cases as depicted in Table3.

Characteristics	Minimum	Maximum	Mean	Std. Deviation
Age	43	90	62.22	8.959
Body Mass Index (BMI)	16	30	23.69	3.213
Fasting plasma glucose	70	240	112.05	44.268
PP plasma glucose	95	406	165.68	67.784
Total cholesterol	76	261	192.51	33.094
Triglyceride	66	278	165.03	51.315
LDL	17	196	129.99	30.994
HDL	14	68	36.06	9.620
VLDL	13	56	26.23	8.871
Serum creatinine	1	2	1.04	0.350
Serum uric acid	5	13	7.20	1.594

Table 4 – Showing Correlation between various parameters and occurrence of MI.

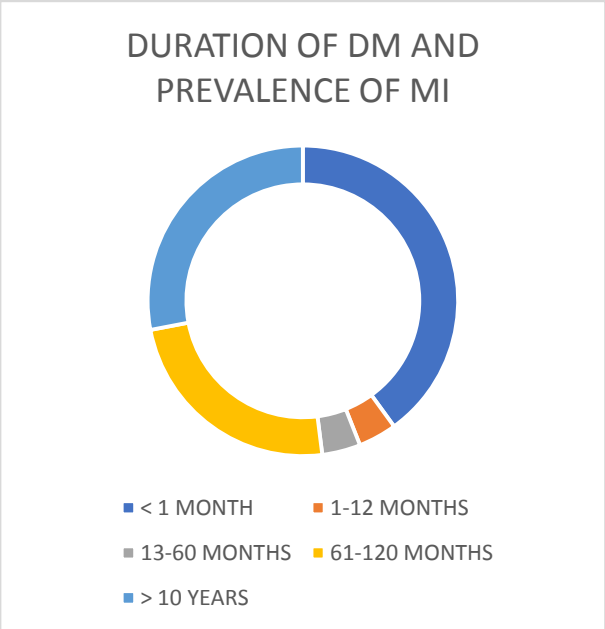


Figure 4 - Duration of DM and Prevalence of MI.

Figure 4 depicting those maximum patients (20 of 50)had DM of less than 1 month duration likely explaining the newly diagnosed cases. Whereas 14 of 50 patients had DM for more than 10 years.

IV. Discussion

A total of 228 patients of acute myocardial infarction were studied, out of which 50 patients were having diabetes mellitus which amounts to an incidence of 21.9 percent. This was very well comparable with prevalence in other studies conducted such as 25% in Sweden,21% in Germany and 17% in Olmsted County, Minnesota.[10,11]Of 228 patients, the incidence of hypertension was noted to be 28.9%. Inspite of so many trials correlating the occurrence of myocardial infarction alongside pre-existing co morbidities, still further research is needed for better identification and quantifying the risk factors and impact.

There is some evidence that improved glycaemic control does in fact improve CV outcomes patients with DM, one study even found that HbA1c in non-diabetic patients is an independent predictor of coronary artery disease and its severity which would suggest that glycaemic control is critical to managing CV health in all patient populations.[12,13]

While this descriptive analytic study suggests an associationbetween glycaemic levels and MI, large randomized control trials such as ADVANCE and ACCORD have shown that the effect of tight glycaemic control on subsequent CVD is modest and largely attributable to coexistent traditional risk factors.[13,14] Additional research is also needed to better understand how traditional CV risk factors including dyslipidemia, obesity and blood pressure should be monitored and managed in diabetic patients. For example, combination therapy may be the best way to treat dyslipidaemia, contrary to the current recommendation that focuses primarily on statin mono-therapy.

In numerous studies, diabetes mellitus or hyperglycaemia was shown to be an independent risk factor in both short- and long-term mortalities after acute MI.[15] Mechanisms of adverse outcomes among DM patients are related to impaired metabolic processes, including insufficiency of energy consumption of myocardium, activation of free radical processes, endothelial dysfunction, arterial thrombus formation, and fibrinolysis.[16]

The DM patients are more vulnerable to development of atherosclerosis that leads to diffuse and multivascular damages of the coronary arteries.

V. Conclusion

Considering the vast number of studies conducted along the similar lines correlating the incidence and prevalence of comorbidities such as hypertension and diabetes mellitus in patients with ischemic heart disease and the burden it has over the morbidity and mortality of patients, it is the need of the hour to strengthen the screening and diagnosis of diabetes mellitus and hypertension alongside obesity and dyslipidemia on a regular interval basis with stringent control of these comorbidities to reduce the burden of cardiovascular morbidity and mortality.

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