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An Observational study on progression of Ischemia in patients with Myocardial Infarction.

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Abstract:
Myocardial Infarction (MI) commonly known as Heart attack occurs when blood flow stops / decreases to a part of heart, causing damage to heart muscle. In myocardial infarction we mostly see acute chest discomfort which occurs when the supply of oxygen is inadequate and don't reach the demand of the myocardium, then the myocardial tissue becomes ischemic and results in death of the myocardial tissue. Biomarkers (Trop-T or I) evaluation is the primary step for detection of Myocardial Infarction. Cardiac catheterization shows the progression of clot in the corresponding coronary arteries. MI is the largest cause of mortality worldwide. Due to lack of awareness many people with acute MI ends with complications like Heart failure, Ventricular dysfunctions, Congestive Heart Failure, Ventricular septal defects, Pericarditis and Cardiac rupture. So, this study aimed to discuss in detail on risk factors, region and percentage of coronary artery occluded, complications and aetiology for progression of ischemia and reasons for restenosis and stent thrombosis in patients with critical Myocardial Infarction.

Key Words: *Sudden cardiac death, Double MI, Restrictive cardiomyopathy, Multiple CVD.*

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I. Introduction:

Myocardial Infarction (MI) may be a minor event in a lifelong chronic disease, it may even go undetected, but it may also be a major catastrophic event leading to sudden death/ severe hemodynamic deterioration. A Myocardial Infarction may be the first manifestation of Coronary artery disease (CAD), or it may occur, repeatedly in patients with established disease[1]. Patients with ischemic heart disease who have symptoms unrelieved by medical management are generally referred for a myocardial revascularization procedure. Due to high prevalence of CAD, both percutaneous coronary intervention (PCI) and Coronary artery bypass graft surgery (CABG) are extremely common procedures[2].

Acute MI is the leading cause of death in elderly patients. Timely perfusion of the infarct -related coronary artery using Fibrinolysis / percutaneous coronary intervention (PCI) is central to optimal STEMI treatment, minimizing myocardial damage, preserving left ventricular function, and decreasing mortality and morbidity.[3] Many patients with acute MI ends with Heart failure (LVF/RVF), acute Pericarditis, cardiac rupture, ventricular pseudo aneurysm, cardiac rupture, complete heart failure, left ventricular mural thrombus, right ventricular-infarction/rupture, mechanical complications(ventricular free wall rupture, papillary muscle rupture, atrial septal defect, ventricular septal defect) and arrhythmic complications (Tachycardia, bradycardia, ventricular fibrillation, atrial fibrillation), Cardiogenic shock and Sudden cardiac death. Fatality from MI remains formidably high, with 50% of patients who die after an acute coronary occlusion doing so within the first hour after the onset of symptoms. Death is commonly due to the dysrhythmia, ventricular fibrillation[4].

Myocardial Infarction is usually the result of thrombosis in a coronary artery, triggered by fissuring or rupture of an atheromatous plaque. Platelets and fibrin are deposited on the damaged plaque resulting in the formation of clot and the occlusion of the artery. Plaque disruption with superimposed thrombosis and rapid coronary stenosis progression is the main cause of the acute coronary syndromes of unstable angina, MI, and sudden death. The time course of infarct evolution i.e., how fast MI develops during coronary artery occlusion for man determined by using CMR, MPS, TZ imaging. The time to reach 50% MI of the MAR (evolution of MI size from normalized to myocardium at risk) was 288 minutes. Acute ischemic heart disease leads by necessity to the chronic ischemic heart disease unless the acute event is treated by revascularization within golden hour[5].

The vital question is not why atherosclerosis develops but rather why after years of indolent growth; it suddenly becomes complicated by life threatening thrombosis. Therefore, we have to focus on plaque composition and vulnerability to rupture and plaque thrombogenicity rather than on plaque size and stenosis

severity. Risk for plaque disruption depends on plaque vulnerability (plaque type) than on degree of stenosis (plaque size). Lipid -rich and soft plaques are more vulnerable and prone to rupture than collagen -rich and hard plaques. They are also highly thrombogenic after disruption because of high content of tissue factor. Plaque size or stenosis severity tells nothing about a plaque's vulnerability. Many plaques are invisible angiographically due to their small size and compensatory vascular remodeling[6].

There is a common misperception that most acute coronary events arise from rupture of mildly stenotic plaques. Moreover, recent intravascular and noninvasive imaging studies have demonstrated that plaques which results in coronary events that have larger plaque volume and necrotic core size with greater positive vessel remodeling compared with plaques, which remain asymptomatic during several years follow up, although these large atheromatous vulnerable plaques may angiographically seem mild. Although a small proportion of truly mild plaques might rupture and become symptomatic, most plaques that are destined to cause events typically undergo rapid plaque progression in the weeks to months before MI and have large necrotic cores at the time of event[7].

II. Materials & Methods:

STUDY DESIGN:

The current study was a prospective observational study of Myocardial Infarction patients presented to the department of cardiology, Sri Krishna Institute of Medical Sciences**,** Guntur, Andhra Pradesh. The data collection for the study was conducted between October 2020 - March 2021**.** The study had included all the patients with Myocardial Infarction who were diagnosed either clinically or radiologically without any age or gender restrictions. Patients with all comorbidities like Diabetes mellitus, Hypertension, Hypothyroidism, Hyperlipidemia, Obesity, and Bronchitis were also included. Pediatrics, pregnant and lactating women, patients with other cardiovascular diseases and out patients were excluded from the study. Data on demographic parameters, drug prescription, angiogram and clinical profile was documented in structured proforma.

III. Results & Discussion:

Descriptive analysis of stages of Myocardial Infarction:

S.NO	STAGE	Male Frequency (n=237)	Male Percentage (%)	Female Frequency (n=113)	Female Percentage (%)
1.	Stage-I	201	57.42	97	27.7
2.	Stage-II	5	1.42	4	1.14
3.	Stage-III	2	0.57	2	0.57
4.	Stage-IV	20	5.71	8	2.28
5.	Stage-V	9	2.57	2	0.57

❖ Highest proportion of subjects belongs to **STAGE-1** both in males and females.

Myocardial Infarction caused either due to i) Atherosclerosis (plaque rupture) ii) Non-atherosclerosis (Sepsis, Operative stress, Anaemia, Heart failure, Hyperthyroidism, low B.P, Respiratory infections, Arrythmias, ventricular hypertrophy i.e., left ventricular hypertrophy, Cardiomyopathy). In our study of 350 patients around 341 patients (97.42%) patients were diagnosed with **MI due to atherosclerosis** (due to atherosclerotic plaque rupture). Around 9 patients (2.57%) were diagnosed with **MI due to Non - atherosclerosis.**

Patients who are with **STAGE-I** (MI due to atherosclerotic rupture) are 298 patients out of 350 (85.14%). Of these 76 patients (21.7%) are diagnosed with SVD (Small vessel disease), 75 patients (21.4%) are diagnosed with DVD (Double vessel disease), 77 patients (22.0%) are diagnosed with TVD (Triple vessel disease) and 70 patients (20.0%) are diagnosed with Mild-Moderate CAD.

Patients who are diagnosed with **Stage-II** (MI due to non-atherosclerotic causes) are 9 patients out of 350 (2.57%). Of these 5 patients are of age group between 60-70 years, 2 patients are of age between 50-60 years and 2 patients had age >70 years. These patients are having hypertension, Diabetes mellitus-II, thyroid as common risk factors. These patients had LBBB (Left bundle branch block), RBBB (Right bundle branch block), Pedal edema, Anaemia and Acute Bronchitis as underlying comorbid conditions. A patient had surgical history of mastectomy. These patients had AV block and Right ventricle total block, Tachycardia, ectopic atrial Bradycardia as complications. Out of these 9 patients 4 were diagnosed with Mild CAD due to dilated cardiac Myopathy, a patient was diagnosed with left bundle branch block, a patient was diagnosed with rt. ventricle rupture, a patient had Mild CAD due to Bradycardia, a patient was diagnosed with Mild CAD due to acute bronchitis and 1 patient was diagnosed with Bradycardia with SVD (small vessel disease). These findings were in accordance with the results of Lotte Saaby et al[8].Where they discovered that type-II M.I is a frequent entity and is more common in females, older individuals and in patients with comorbidities.

Patients who are with **STAGE-III** (MI due to sudden cardiac arrest/ cardiogenic shock) are 1.14% (4 out of 350 patients). Of these 4 patients 3 patients are of age between 70-80 years and a patient was between 40-50 years. These patients had Hypertension, Diabetes Mellitus-II, Hyperlipidemia, Asthma, COPD as risk factors.

2 patients out of 4 had habitual smoking. These patients had Septic shock, Lobar pneumonia, Hypotension as underlying comorbid conditions. These patients had Bradycardia, LV thrombus, Hemopericardium, PEA (pulse less electrical activity) due to severe hypotension as complications. 1 out of 4 patients was diagnosed with Dilated cardiomyopathy with old CVA (Cerebro vascular accident) deemed to be reason for death, another patient had CVA with mild CAD (SVD) and is cardio embolic which is deemed to be reason for death, a patient was diagnosed with SVD, LV thrombus and left ventricular perforation and was dead due to Massive acute MI and severe hypotension, a patient was diagnosed with SVD and Mitral valve rupture and was dead due to severe hypotension and sudden cardiac arrest.

Patients with **STAGE-IV** (MI due to stent thrombosis) are 28 out of 350 patients (8.0%). Of these 28 patients; 4 patients had Triple vessel disease (TVD) and undergone CABG surgery after PTCA stenting, 1 patient had Mild CAD and undergone Thrombolysis after PTCA stenting, 3 patients had SVD, 6 patients had DVD and undergone RE-PTCA stenting after PTCA and 11 patients had Mild CAD and took medical management after PTCA stenting. 1 patient had Acute Gastritis and took medical management. 1 patient had multiple cardiovascular disease and undergone ICD implantation. 1 patient had acute Pericarditis and undergone Pericardiocentesis.

Patients with **STAGE-V** (MI related to CABG) are 11 out of 350 patients (3.14%). Of these 11, 2 patients had SVD and 2 patients had DVD and undergone PTCA stenting, 5 out of 11 patients had Mild CAD and took medical management, 1 out of 11 patients had complete Heart failure and undergone ICD implantation and 1 out of 11 patients had Mesenteric ischemic and undergone surgery.

Descriptive analysis showing Types of Myocardial Infarction:

S.no	Type	Frequency (n=337)	Percentage (%)
1.	CAD with STEMI	23	6.57
2.	CAD with NSTEMI	15	4.28
3.	CAD with AWMI (Anterior wall MI)	55	15.7
4.	CAD with IWMI (INFERIOR WALL MI)	37	10.57
5.	CAD with AASTEMI (Acute Anterio-Septal STEMI)	9	2.57
6.	CAD with ILSTEMI (Inferio-Lateral STEMI)	7	2.0
7.	CAD with Unstable Angina	120	34.2
8.	CAD with Stable Angina	30	8.57
9.	CAD with Cardiomyopathies (Ischemic, restrictive, dilated)	5	1.42
10.	CAD with Septal Defects (ASD/VSD)	6	1.71
11.	CAD with BBB(LBBB/RBB)	23	6.57
12.	CAD with AVD (Aortic valve disease)	3	0.85
13.	CAD with ALMI (antero-lateral MI)	4	1.14

- LBBB- left bundle branch block.
- RBBB-right bundle branch block.
- Highest proportion of subjects belongs to CAD with Unstable Angina and are at high risk.

Descriptive analysis showing modifiable and non-modifiable risk factors of Myocardial Infarction using Bar diagram:

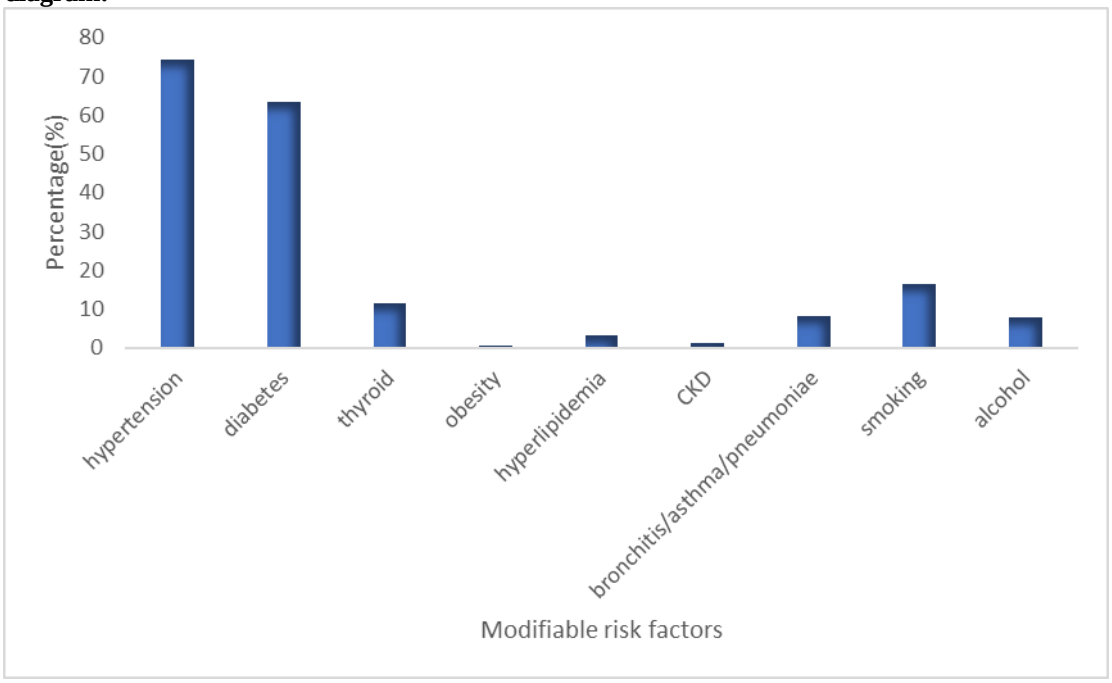

Fig. 1.0 Bar diagram showing modifiable risk factors.

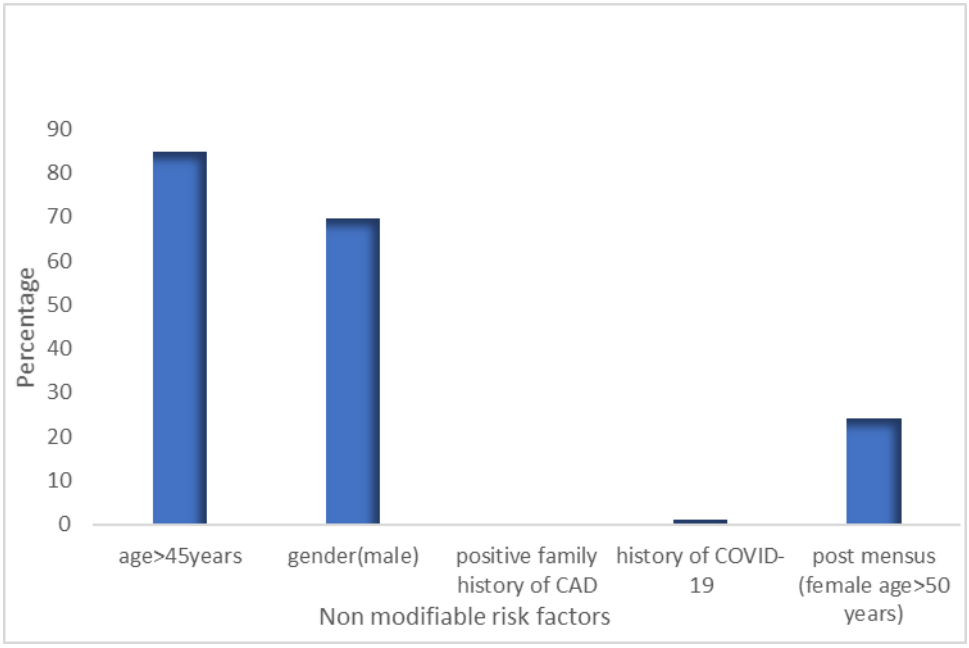

Fig. 1.1 Bar diagram showing non-modifiable risk factor.

In this study of 350 patients, we came to know that most people who are at a high risk of MI belongs to age group of **50-60 years**. The elderly with acute MI has been reported to present with atypical symptoms. Men age >45 years and women age>55 years older are more likely to have a Heart attack than young patients. These findings were in accordance with the results of Sonia S. Anandet.al[9.]

Among non-modifiable risk factors **age>45 years** is the most common risk factor and **Masculine gender** is common risk factor for acute MI. Men who have angry or hostile personalities, in particular, have a higher risk of developing heart diseases. Sexual problems related to heart disease can cause added anxiety or relationship stress.

Uncontrolled Blood pressure is one of the most common risk factors for acute Myocardial Infarction in both males and females. High blood pressure increases the risk for Myocardial Infarction as much as 4-fold.

Giving therapy, regular use of anti-hypertensives for high B.P can avoid complications of MI. Therefore, it is important for physicians to monitor & control blood pressure in the elder patients.

Diabetes Mellitus-II is the one of the most common risk factors for acute MI. An uncontrolled blood sugar level is the common risk factor for acute myocardial infarction. High blood sugar levels increase the chance of atherosclerotic plaque formation and thrombosis, thereby contributing to MI. Silent MI is a common occurrence and appears to occur with increased frequency in patients with diabetes, as a result of cardiac autonomic dysfunction. Giving therapy, regular use of oral hypoglycemics and regular monitoring of sugar levels of the patient is necessary. These findings were in accordance with the results of Fatemeh Kiani et al.,[10.] Where Hypertension, Diabetes mellitus-II, age>45 years are common risk factors in patients with Myocardial Infarction.

Hypothyroidism is one of the common risk factors for acute MI. An excess thyroid hormone influences the force and speed of heart beat, blood pressure and cholesterol levels. As a result, malfunction thyroid gland can cause problems that masquerade as heart diseases or worsens existing heart diseases. Regular monitoring of thyroid hormone levels and use of anti-thyroid drugs is necessary.

Smoking is one of most common risk factors for acute MI. Chemicals in smoke cause the blood to thicken and form clots inside veins and arteries. Smoking increases the risk of Inferior wall MI. smoking thus appears to affect the right coronary arterial circulation. Thus, avoiding smoking is necessary to prevent further progression of occlusion and complications of MI.

Alcohol consumption is one of the most common risk factors for acute MI. Habitual moderate alcohol consumption is associated with a lower risk of acute Myocardial Infarction where as heavy binge drinking is associated with higher cardiovascular risk. Too much alcohol consumption raises your blood pressure and promotes the progression of atherosclerosis. Acute and prolonged intake of alcohol (3-4 or more daily) increase the risk of a heart attack[11]. Therefore, heart patients should restrain from alcohol in order to avoid complications and progression of occlusion.

Hyperlipidemia is one of the most common risk factors for acute MI. High cholesterol levels can increase the risk of heart diseases and can develop fatty deposits in blood vessels which block the arteries that supply blood to heart. Hence regular management of cholesterol levels and avoiding high fatty food consumption is necessary.

Obesity is one of the risk factors for acute MI. Excess body weight and obesity are linked with increase in high blood pressure, diabetes, heart diseases. Obesity leads to structural and functional changes of heart, which causes heart failure. The altered myocardial structure increases the risk of atrial fibrillation and sudden cardiac death. Obesity has an important role in CAD and atherosclerosis.

Asthma/ pneumoniae/ bronchitis/ pulmonary edema/ pleural effusion: is one of the risk factors for acute MI. Inactive asthma didn't increase the risk of MI, active asthma can double the risk of cardiovascular event like a heart attack, stroke, or related condition, and taking daily medication for asthma can increase the risk of a cardiovascular event by 60% over 10 years. Other Respiratory infections like pneumonia, pulmonary edema, bronchitis, all seem to increase the chances of having a heart attack.

Post covid-19 status is one of the recent risk factors for patients with Acute Myocardial Infarction in our study. Post COVID-19 status associated with post infectious vasculopathy and arterial events like acute arterial thrombosis[12]. So, patients with post COVID-19 status must be under special care and regular monitoring of patient must be done.

Descriptive analysis of complications of Myocardial Infarction:

S.no	Category	Frequency (n=74)	Percentage (%)
1.	Arrhythmic-Complications (Tachycardia Bradycardia Ventricular -fibrillation Atrial fibrillation)	32	9.14
2.	Mechanical Complications (Ventricular-free wall rupture Papillary-muscle rupture)	1	0.28
3.	Left-ventricular aneurysm	1	0.28
4.	Right-ventricular infarction/rupture	2	0.57
5.	Ventricular- pseudo aneurysm	2	0.57
6.	Pericarditis	3	0.85
7.	Left-ventricular mural thrombus	2	0.57
8.	Heart-failure (LVF, RVF)	13	3.71
9.	Atrial-septal defect/ Ventricular-septal defects	6	1.71
10.	Cardiogenic-shock, Sudden cardiac death	4	1.14
11.	Cardiac rupture	1	0.28

12.	Complete-heart failure	1	0.28
13.	Complete heart block	1	0.28
14.	Mesenteric ischemia	1	0.28
15.	Multiple-cardiovascular diseases	1	0.28
16.	Double M. I	3	0.85

❖ Of all the complications of Myocardial infarction most people ended with **Arrhythmic complications** (tachycardia, bradycardia, ventricular fibrillation, atrial fibrillation, supra ventricular tachycardia).
A patient required **ICD due to complete Heart Failure** and had age > 70 years and hernia, left bundle branch block, hepatomegaly as underlying comorbid conditions. POST PTCA and POST CABG as surgical history. Due to these factors severe occlusion progression occurred resulting in Heart failure even after successful PTCA and CABG requiring ICD.
A patient had **Multiple cardiovascular disease** having hypertension, diabetes mellitus, hyperlipidemia as risk factors. Age >60 years and pericardial effusion as comorbid conditions. Cardiac tamponade, coronary fistula patch repair as complication. Due to these factors' occlusion progression occurred in this patient.
A patient had **Mesenteric Ischemia after post CABG,** this patient had age >50 years and hypertension, diabetes mellitus-II as risk factors and renal calculi, mesenteric Ischemia due to intestinal obstruction as underlying comorbid conditions. Due to these factors severe occlusion progression occurred resulting in mesenteric ischemia.

Double MI: Acute myocardial infarction (AMI) involving acute transmural ischemia of two vascular territories at the same time, which is known as double/ combined infarction, is a well described phenomenon and rarely reported. In our study 3 patients were diagnosed with Double MI**.** 2 patients had age between 50-60 years and 1 patient had age of 32 years. These patients had hypertension, diabetes mellitus-II as risk factors. These patients had TIA (Transient ischemic attack), concentric LVH as comorbid conditions. 1 out of 3 patients was diagnosed with DVD with TIA and done PTCA stenting. A patient had AWMI (Anterior wall myocardial infarction) and was diagnosed with CAD (Mild TVD) with acute double MI and undergone PTCA stenting. A patient had IAWMI (Inferio anterior wall MI) and was diagnosed with CAD (TVD) with acute Double MI and undergone PTCA stenting.

Descriptive analysis showing angiographic report using Bar diagram:

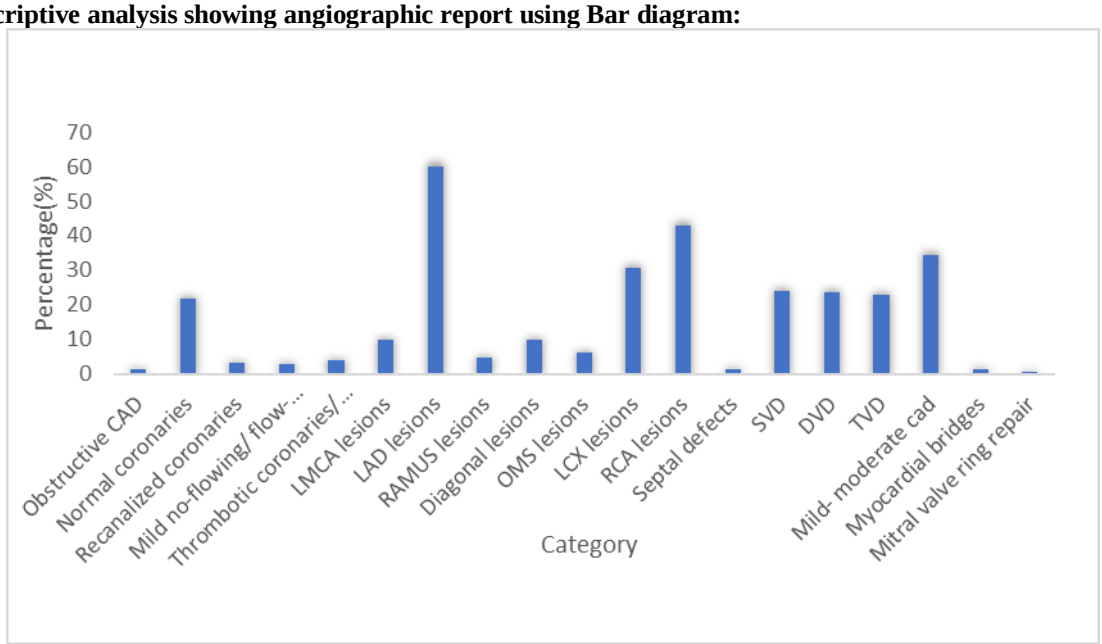

Fig. 1.2 Bar diagram showing angiographic report.

treatment for Myocardial Infarction using bar diagram:

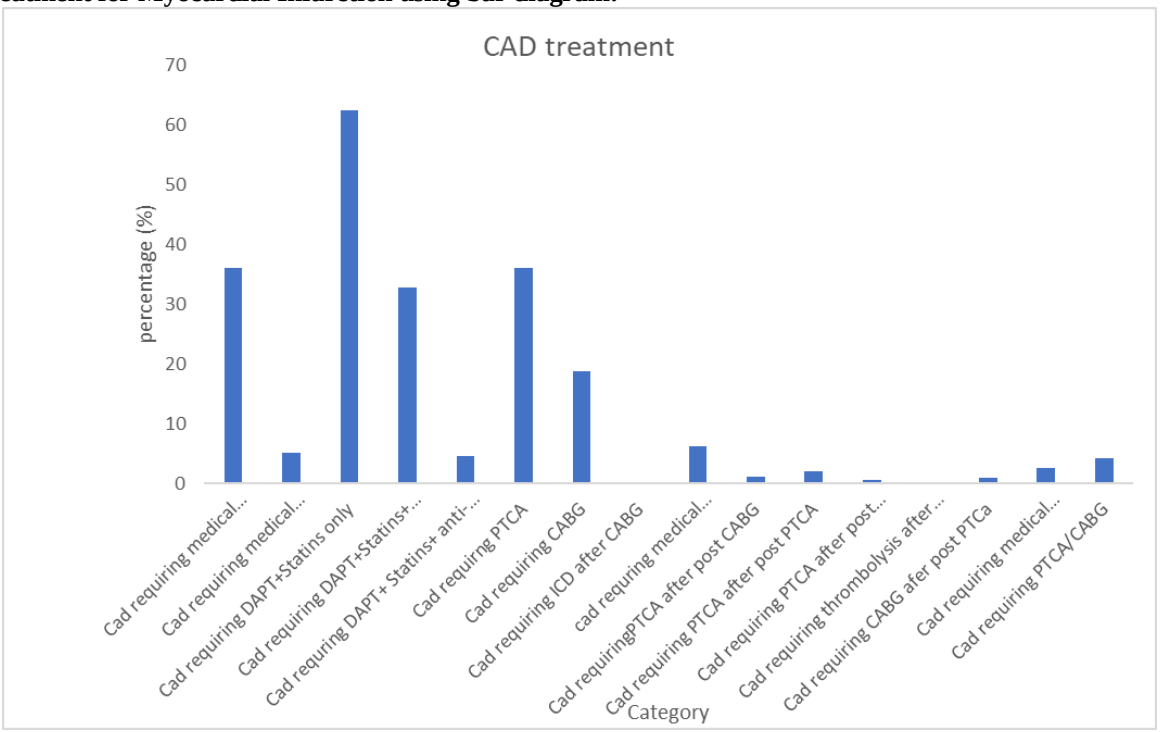

Fig. 1.3. Bar diagram showing treatment for myocardial infarction.

Patients diagnosed with **Mild CAD-Moderate CAD** i.e., coronary artery stenosis (10-70%) are 36.0% (126 out of 350 patients) were prescribed with medical management of Dual-antiplatelet therapy, statins for patients with LDL cholesterol >130mg/dl and cardiac rehabilitation (life style advice, exercise, social support, as well as recommendations about stress management). Patients with STEMI and ischemic symptoms for less than 12-24 hours which is unrelieved by Nitroglycerin and if PCI can't be performed within **20-90 minutes** are treated with fibrinolysis/thrombolysis using (Reteplase, Streptokinase, Tenecteplase) 18 out of 350 patients (5.14%).

All the inpatients with CAD were treated with 1) **DAPT therapy** (dual anti platelets; (Aspirin 75-325mg O.D and Clopilet 75-150mg O.D). 2) **Statins** (ATORVA-80 mg H.S). 3) **Anti-coagulants** (Heparin 5000-10000 IU QID/Enoxaparin 0.5ml S.C/Warfarin 5mg). 4) **Analgesics** (morphine sulfate/meperidine) 5) **Anti-thrombolytics** (streptokinase/ Reteplase/Tenecteplase) 6) sub lingual nitroglycerin for malignant hypertension (B.P >180 mm of hg) were prescribed. While patients with severe coronary artery stenosis of 70-100% or total cut off i.e., **SVD**, **DVD**, **TVD** were treated with surgical interventions like **PTCA** (percutaneous transluminal coronary angioplasty) / **CABG** (coronary artery bypass graft surgery).

A Patient had **Restrictive cardiomyopathy (**A form of cardiomyopathy in which the walls of the heart are rigid. Thus, the heart is restricted from stretching and filling with blood properly.). This patient had age>80 years and hypertension, diabetes mellitus as risk factors & complete heart block as complications and this patient was diagnosed with DVD due to restrictive cardiomyopathy & done PTCA stenting to RCA.

Patients with **Ischemic Cardiomyopathy** are 0.85% (3 out of 350 patients) these patients were of age> 60 years and had hypertension as risk factor. A patient had acute LVF and. 1 patient was diagnosed with TVD and CABG was done and another patient was diagnosed with DVD and PTCA stenting was done.

Restenosis occurs due to the new tissue that can close off the space inside the stent and back blood flow causing chest pain. Patients requiring **thrombolysis** after successful **PTCA** are 0.28% (1 out of 350 patients). This patient had hypertension, diabetes mellitus -II as risk factors and bilateral pleural effusion, pulmonary edema and anemia as comorbid conditions. Patient was diagnosed with thrombotic and recanalized coronary arteries on angiogram so, due to this underlying comorbidities, risk factors and age>50 years, poor diet and lack of exercise occlusion progression occurred in this patient resulting in thrombotic coronary arteries requiring thrombolysis even after successful PTCA stenting.

Patients requiring **PTCA** after **POST PTCA** is 2.0% (7 out of 350 patients) of these 4 patients are of age group between 50-60 years and 3 patients are of age between 60-70. These patients had Hypertension, Diabetes Mellitus, and Hypercholesteremia and Hypothyroidism as risk factors. These patients had social history of smoking and alcohol consumption. A patient had hyponatremia as underlying comorbidity. Of 7 patients 4 patients had SVD and 3 patients had DVD as past medical history and done PTCA stenting (past

surgical history). Due to age >50 yrs, underlying comorbidities and risk factors like hypertension, diabetes mellitus, thyroid and hypercholesteremia, social habit of smoking and alcohol, poor dietary habit ischemic progression and restenosis occurred in this patient requiring RE PTCA even after successful PTCA stenting in past.

Patients requiring **CABG** after **successful PTCA** are 0.85% (3 out of 350 patients). These patients had diabetes mellitus, hypertension and CKD as risk factors. 2 patients are of age between age 50-60 years, 1 patient was 63 years old. A patient had habit of smoking. So, due to underlying risk factors and age >50 years and smoking habit these patients had occlusion progression resulting in Triple vessel disease requiring CABG from Single vessel disease/Double vessel disease with successful PTCA stenting.

Patients requiring **PTCA** after **Medical management** are 0.57% (2 out of 350 patients). These patients had age of 53 years, 76 years. A patient had social history of smoking. These patients had hypertension, hyperlipidemia and diabetes mellitus-II as underlying risk factors. A patient had aorto-iliac disease as complication and was diagnosed with SVD (Small Vessel Disease) and undergone PTCA stenting after taking medical management in past years. A patient having a past history of old Mild DVD was diagnosed with AWMI with TVD and undergone PTCA stenting.

Patients requiring **PTCA** after **POST-CABG** are 1.14% (4 out of 350 patients). Out of which 3 patients had age between 60-70 years and a patient had age >50 years. These patients had hypertension, diabetes-mellitus, and thyroid as risk factors. These patients had PVD (peripheral vascular disease) and PND (paroxysmal nocturnal dyspnea) as underlying comorbid conditions. A patient had a habit of smoking. A patient had Diastolic heart failure as complication. 1 out of 4 had past surgical history of ASD closure. Of all these 4 patients with successful CABG due to underlying comorbid conditions like PND, PVD and risk factors like hypertension, diabetes mellitus, thyroid and age>50 years and smoking habit the occlusion progressed in these patients requiring additional PTCA stenting for SVD (2 out of 4 patients), DVD (2 out of 4 patients) even after successful CABG surgery.

Patients requiring **Medical management** after **POST-PTCA/ CABG** are 6.28% (22 out of 350 patients). Out of these 11 patients are of age group between 50-60 years and 8 patients are of age group between 60-70 years, 3 patients are of age >70 years. These patients are having both hypertension and diabetes mellitus, Hypothyroidism, hypercholesteremia, COPD as risk factors. These patients had social history of smoking and alcohol consumption. These patients had abdominal discomfort, cellulitis, pedal edema, pleural effusion, Atrial fibrillation, CHF, anemia, hyponatremia, urinary tract infection, severe iron deficiency anemia as underlying comorbid conditions. 5 out of 22 patients are in POST CABG status of which 1 patient had CHF ,1 patient had drug induced edema and cellulitis, 2 patients had mild CAD, 1 patient had mitral valve repair. 17 out of 22 patients are in post PTCA status of which 12 patients had SVD (small vessel disease) and undergone PTCA stenting in the past, 1 patient had mild cad with post PTCA status, 1 patient had acute Pericarditis with post PTCA status, 1 patient had DVD (double vessel disease) and undergone PTCA stenting in past.1 patient had mild CAD with left leg cellulitis. 1 patient had severe iron deficiency anemia, urinary tract infection, right hip fracture and peptic ulcer disease and received medical management. Ischemic progression occurred in this patient due to underlying risk factors like hypertension, diabetes mellitus, thyroid, hypercholesteremia as risk factors, age >50 years, underlying comorbidities like abdominal discomfort, pedal edema, pleural effusion, cellulitis, anemia, COPD, hyponatremia, complications like CHF, acute Pericarditis, AV block, Atrial fibrillation and social habits of smoking, alcohol consumption which resulted in occlusion progression even after successful PTCA stenting requiring medical management**.**

Ischemic progression analysis in coronary arteries through bar diagrams:

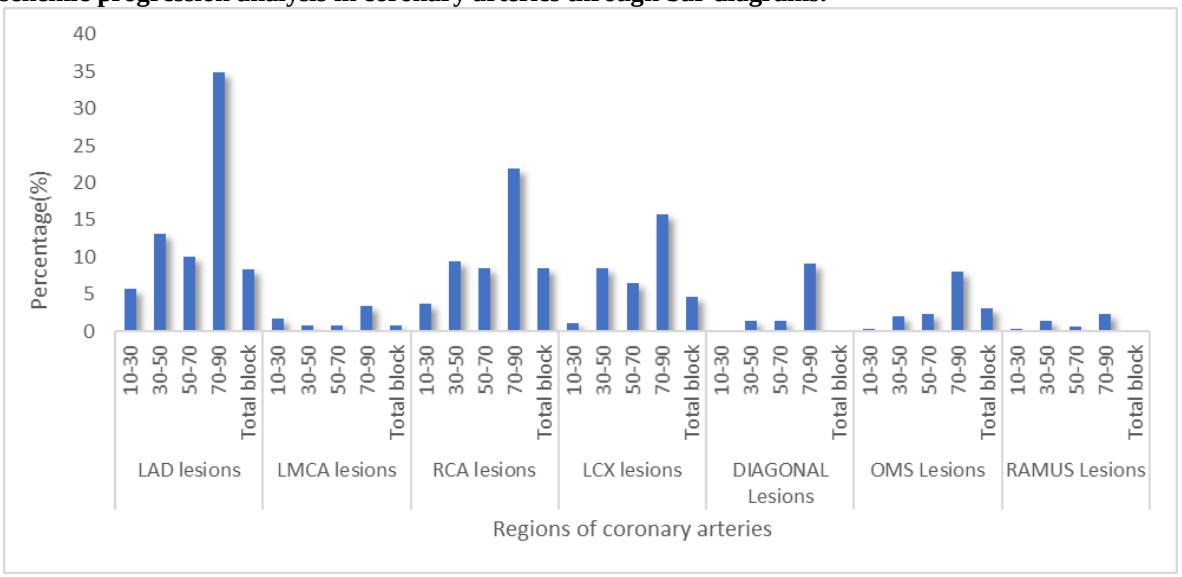

Fig. 1.4 Bar diagram showing progression of ischemia in coronary arteries.

Occlusion progression of coronary arteries occurs either due to i) underlying comorbid conditions like Diabetes mellitus, hypertension, thyroid, asthma, pulmonary- edema, or bronchitis ii) poor medication adherence resulting in restenosis/reocclusion in coronary arteries. iii) Older age, compromised immune system. Myocardial Infarction if left untreated or not taken care may result in complications resulting death.

Of total 350 patients the no of patients with ischemic progression are 43 patients (12.28%). In our study patients with AWMI (anterior wall myocardial infarction) are 55 out of 350 (15.71%) who had LAD lesions. Patients with IWMI (Inferior Wall myocardial infarction) are 37 out of 350 (10.57%) who had RCA lesions. Patients with ILSTEMI (Inferio lateral STEMI) are 7 out of 350 (2.0%) who had LCX lesions. Patients with Triple vessel disease has more underlying risk factors, comorbid conditions and age>70 years. Patients with restenosis had underlying risk factors like hypertension, diabetes mellitus, hypothyroidism and are with comorbid disease conditions and complications like arrhythmias, heart failure, cardiac rupture, acute pericarditis and required percutaneous transluminal coronary angioplasty, coronary artery bypass surgery, pacemaker, implantable cardioverter- defibrillator.

IV. Conclusion:

The study findings suggest that age>45 years and hypertension are the major risk factor for acute M.I. So, to reduce hypertension proper diet and regular exercise must be followed. Prevention is better than cure. Early identification and management of risk factors like hypertension, diabetes mellitus, hyperlipidemia, chronic kidney disease & regular use of anti-hypertensives, oral hypoglycemic drugs to prevent risk of Myocardial Infarction. Change in life style habits like smoking & alcohol consumption, regular use of antiplatelets, statins may reduce the risk of progression of ischemia. Proper use of DAPT therapy with adjuvant anticoagulants and Thrombolytics, early diagnosis, monitoring the patients may prevent further complications of Myocardial Infarction. Follow up of the patients should be taken for the medication adherence and to prevent progression of ischemia. Among the patients with acute MI, arrhythmic complication is the most common complication resulting in death. Ischemic progression in these patients occurred even after successful PTCA/CABG due to older age and underlying comorbid conditions, risk factors, poor diet and poor medication adherence. The people with good educational background had awareness on early identification of Myocardial Infarction symptoms and its risk factors. All cardiac Patients must undergo cardiac rehabilitation programme for proper control over Myocardial Infarction. Regular exercise, meditation and yoga helps in maintaining good heart condition. Proper diet intake of green leafy vegetables, fruits, red wine, avoiding high fatty foods consumption is necessary.

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