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The Impact of Hypertension and Diabetes Mellitus and Other Risk Factors in Myocardial Infarction Patients

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ABSTRACT: Myocardial Infarction is a coronary artery disease (CAD). In this case death of the heart muscle due to lack of oxygen supply to the walls of the heart muscle. Symptoms are chest pain, pain radiating to the left shoulder, jaw, neck and back, shortness of breath, pedal edema. Risk factors of myocardial infarction are age, gender, family history, hypertension, diabetes mellitus, obesity, smoking, alcohol, hyperlipidemia, and creatinine. Myocardial Infarction is caused by atherosclerotic plaque formation in the coronary arteries. It is diagnosed by ECG, Coronary Angiogram. Treatment with anticoagulants (Heparin, Clopidogrel, Ticagrelor), antiplatelets (Aspirin, Ecosprin), statins (Atorvastatin, Rosuvastatin). Surgical procedures with PCI insertion that is Percutaneous Transluminal Coronary Angioplasty (PTCA) and Coronary Artery Bypass Grafting (CABG). MI classified as ST segment Elevated Myocardial Infarction (STEMI) and Non-ST segment Elevated Myocardial Infarction (NSTEMI). Types of MI are AWMI, IWMI, PWMI, LWMI, ALWMI, IPWMI, and ILWMI. The epidemiological study was done among 300 patients the results are males were more affected 185 (62%), than females 115 (38%). In males 40-49 age group patients have 52 (17.33%) high risk. In females 40-49 & 60-69 age group patients have 32(10.67%).

KEY WORDS: Coronary artery disease, PTCA, CABG, STEMI, NSTEMI.

I. INTRODUCTION: MYOCARDIAL INFARCTION

Myocardial Infarction is known as Heart attack. Myocardial Infarction is a blockage of blood flow to the heart muscle.

- Myocardial Infarction is belongs to coronary artery disease (CAD).
- Myocardial Infarction usually occurs when a blood clot decreas (or) block the blood flow to the heart. Without blood, tissue loses oxygen and dies.

It divides into ST segment Elevated Myocardial Infarction (STEMI), Non-ST segment Elevated Myocardial Infarction (NSTEMI), Unstable Angina.

1. TYPES OF MI

1. Anterior Wall Myocardial Infarction (AWMI)
2. Inferior Wall Myocardial Infarction (IWMI)
3. Posterior Wall Myocardial Infarction (PWMI)
4. Lateral Wall Myocardial Infarction (LWMI)
5. Anterio-Lateral Wall Myocardial Infarction (ALWMI)
6. Inferio-Posterior Wall Myocardial Infarction (IPWMI)
7. Septal Wall Myocardial Infarction (SWMI) – It is rare condition.

2. SYMPTOMS

Myocardial Infarction symptoms are include

- Chest pain
- Shortness of breath
- Pain radiating to the left arm and neck
- Sweatings
- Nausea, Vomiting
- Jaw and back pain
- Pedal edema
- Abnormal heart beat

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- Anxiety, stress
- Fatigue and Depression.

3. ETIOLOGY

➢ Most of the Myocardial Infarction cases are caused by formation of the atherosclerotic plaque.

4. RISK FACTORS

Modifiable and Non-modifiable risk factors for Myocardial Infarction. Age, Gender and Hereditary is non-modifiable risk factors. Like Hypertension, Diabetes mellitus, Smoking, Alcohol, Hyperlipidemia, Sr. creatinine, Obesity, Physical activity and Stress are modifiable risk factors.

5. DIAGNOSIS

Myocardial Infarction is diagnosed by

- ECG
- Cardiac markers
- Coronary Angi ogram (CAG).

i. ECG

It has P wave, QRS complex, T wave. We observe in the Myocardial Infarction ST segment elevation or not, T wave tall or inversion, widening QRS complex.

ii. CARDIAC MARKERS

Cardiac markers are – cell contents (Troponin I, Troponin T, Myoglobin) and cardiac enzymes (Creatine Kinase-MB isoenzyme [CK-MB]), after myocardial cell necrosis these are released into the bloodstream.

iii. CORONARY ANGIOGRAM:

MI detects by ECG to formation of atherosclerotic lesions in the coronary arteries.

Table - 1

TYPE OF MI	CORONARY ARTERY
AWMI	Left Anterior Descending Coronary Artery (LAD)
PWMI	Left Circumflex branch (Cx)
IWMI	Right Coronary Artery (RCA)
LWMI	Left Circumflex branch (Cx)

1. Single Vessel Disease (SVD): Only one branch of the coronary artery is affected. Atherosclerotic lesions form in the specific area of the coronary artery. Like LAD (or) Cx (or) RCA. Ex: AWMI, IWMI, PWMI, LWMI.
2. Double Vessel Disease (DVD): 2 vessels of coronary artery are affected. Atherosclerotic lesion in the LAD and Circumflex branch. Left main coronary artery was affected (LMCA). Ex: ALWMI
3. Triple Vessel Disease (TVD): Total left main coronary artery and RCA were blocked. Lesions in the all coronary arteries.

6. PATHOPHYSIOLOGY

a) IN HTN PATIENTS

HTN → Narrowing of blood vessels → Impaired blood flow → Rupture of the arteries → Thrombus formation → Ischemia → Necrosis → Myocardial Infarction.

b) IN DM PATIENTS

DM →Plaque formation in the coronary artery → Obstruction to the blood flow → Thrombus → Ischemia → Myocardial Infarction.

7. TREATMENT

1. DRUG THERAPY

Drug therapy include Beta receptor blockers, angiotensin II receptor blockers (ARB'S), angiotensin converting enzyme (ACE) inhibitors, aldosterone receptor antagonists. The main aim of treatment is the prevention of the LV remodeling.

2. THROMBOLYTIC THERAPY

Thrombolytic therapy is used for recanalization of the blocked coronary artery. Thrombolytic therapy onset of action within 6 hours. These are inhibition of thrombus formation and dissolve the blood clots. Commonly used thrombolytics are Streptokinase, Urokinase and tissue -type plasminogen activators. Side effects are intracerebral hemorrhage and unwanted bleeding.

3. PERCUTANEOUS CORONARY INTERVENTION (PCI)

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It is a surgical procedure for remodeling of coronary artery. Coronary artery blocked with 90% lesions then performed inject the Percutaneous Transluminal Coronary Angioplasty (PTCA), into the blood vessel, is called stent. Side effects are allergic reactions, infection at the catheter insertion area.

4. CORONARY ARTERY BYPASS GRAFTING (CABG)

It is an effective surgical treatment. CABG done in whose The Left Main Coronary Artery and Right Coronary Arteries are completely blocked. It is mostly done in Triple Vessel Disease.

II. MATERIALS AND METHODOLOGY: MATERIALS AND METHODOLOGY

1. STUDY SITE: Hospitals at Bhadradri-Kothagudem Dist

2. STUDY TYPE: Epidemiological study.

3. STUDY CRITERIA

A. INCLUSION CRITERIA

1. Myocardial Infarction patients
2. Age: 30-90 years

B. EXCLUSION CRITERIA

1. Age below 30 years
2. Pregnancy and lactation women.

C. SOURCE OF DATA

A. Patient data records
- i. Patient demographic details
- ii. Family history and Social history
- iii. History of co-morbid conditions
- iv. Treatment

B. Patient interview
- i. Disease severity
- ii. No. of medications used
- iii. Regular usage of medication
- iv. Physical activity

D. FORMS INCLUDED IN THE STUDY

1. Data collection form including patient details, symptoms, medication used, diagnosis, type of MI, treatment.
2. Which coronary artery effected.
3. Present of known history of MI.

III. STUDY PROCEDURE

Subjects with myocardial infarction are selected based on inclusion and exclusion criteria.

1. Patient demographic data was collected from patient records.
2. Patient having or not of co-morbid conditions.
3. Severity of disease is known by percentage of left ventricle ejection fraction (LVEF) in 2D-Echo

Table - 2

SEVERITY	(LVEF)
Normal	55-70%
Mild	40-55%
Moderate	35-40%
Severe	Below 35%

4. Based on age, MI patients were divided into 3 groups

a) Group 1: 30-39 years
b) Group 2: 40-49 years
c) Group 3: 50-59 years
d) Group 4: 60-69 years
e) Group 5: 70-79 years
f) Group 6: 80-89 years
g) Group 7: 90-99 years

5. Based on co-morbidic conditions, MI patients were divided into 4 groups
   - i. Only Hypertension
   - ii. Only Diabetes Mellitus
   - iii. Combination of HTN and DM
   - iv. Absence of HTN and DM

6. Based on medication adherence, patients were

A. Using medication
B. Using PCI
C. Using CABG

7. Severity based on percentage of atherosclerotic plaque in the coronary artery in CAG.
8. The data collected throughout 6 months from 300 patients was analyzed.
9. This total summarized data entered in the Microsoft excel.
10. Patients was separated based on Age, Gender, co-morbid conditions, known history of MI, Type of MI.
11. SAMPLE SIZE: 300

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IV. RESULTS

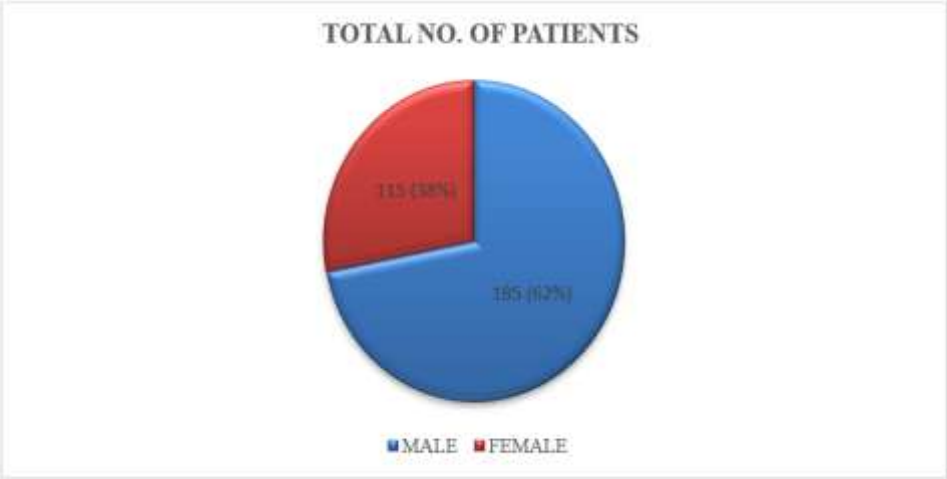
1. GENDER WISE DISTRIBUTION OF CARDIAC ILL PATIENTS

Out of total 300 patients, the highest no. of patients males (185) were affected, and least no. of patients females (115) were affected.

Table -3

GENDER	TOTAL NO. OF PATIENTS
MALE	185 (61.7%)
FEMALE	115 (38.3%)

Fig – 1



2. AGE WISE DISTRIBUTION OF CARDIAC ILL PATIENTS

Out of 300 patients 40-49 age group people (84) were more affected, especially males were the highest no. that is (52), followed by 50-59 age group males were more affected (46), the least no. of affected patients 90-99 age group patients.

Table - 4

	30-39 YEARS AGE	40-49 YEARS AGE	50-59 YEARS AGE	60-69 YEARS AGE	70-79 YEARS AGE	80-89 YEARS AGE	90-99 YEARS AGE
MALES	**13(4.3%)**	**52(17.33%)**	**46(15.33%)**	**41(13.67%)**	**27(9%)**	**5(1.67%)**	**1(0.33%)**
FEMALES	**6(2%)**	**32(10.67%)**	**25(8.33%)**	**32(10.67%)**	**18(6%)**	**2(0.67%)**	**0**
TOTAL	**19 (6.3%)**	**84(28%)**	**71(23.7%)**	**73(24.4%)**	**45(15%)**	**7(2.3%)**	**1(0.3%)**

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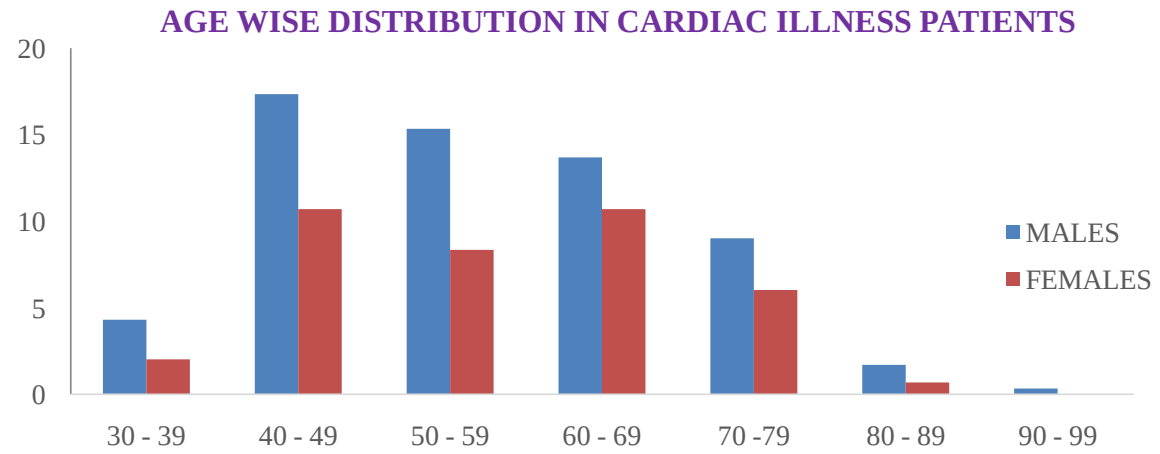
Fig - 2



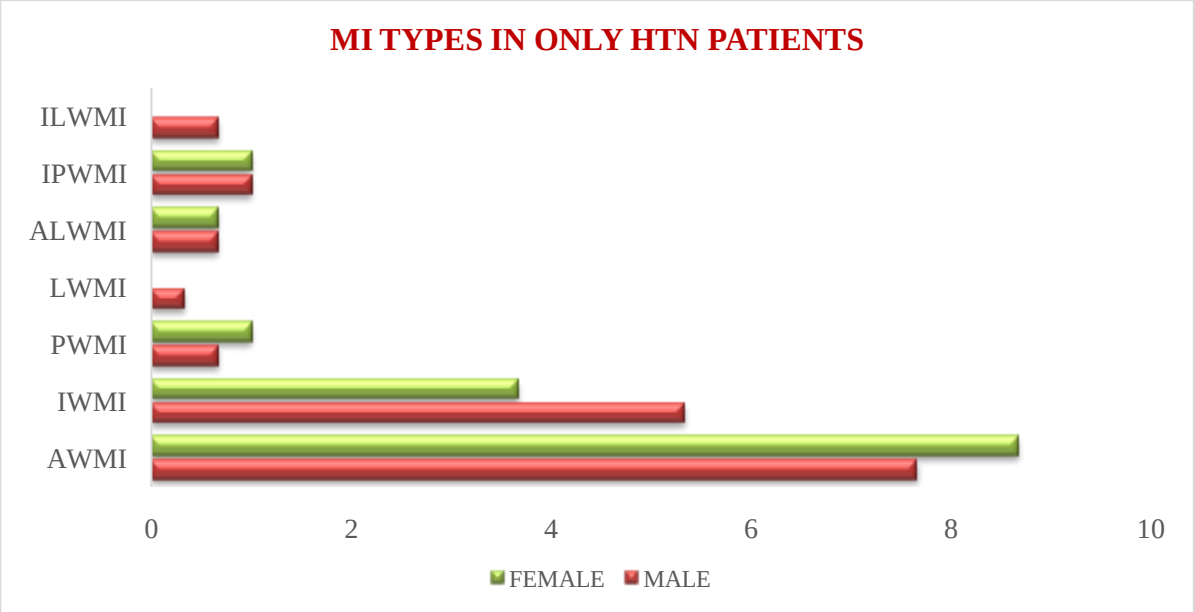
3. TYPES OF MI IN ONLY HTN HAVING PATIENTS

Out of 300 patients 94 patients having only HTN without Diabetes. In these males (49) were more affected and females (45)were affected. The most of patients were exposed to AWMI (49) especially females (26) were more affected, and the least no. of patients were exposed to LWMI (1).

Table - 5

	AWMI	IWMI	PWMI	LWMI	ALWMI	IPWMI	ILWMI	TOTAL
MALE	23(7.66%)	16(5.33%)	2(0.67%)	1(0.33%)	2(0.66%)	3(1%)	2(0.67%)	49(16.33%)
FEMALE	26(8.67%)	11(3.67%)	3(1%)	0	2(0.66%)	3(1%)	0	45(15%)
TOTAL	49(16.33%)	27(9%)	5(1.67%)	1(0.33%)	4(1.33%)	6(2%)	2(0.67%)	94(31.33%)

Fig - 3



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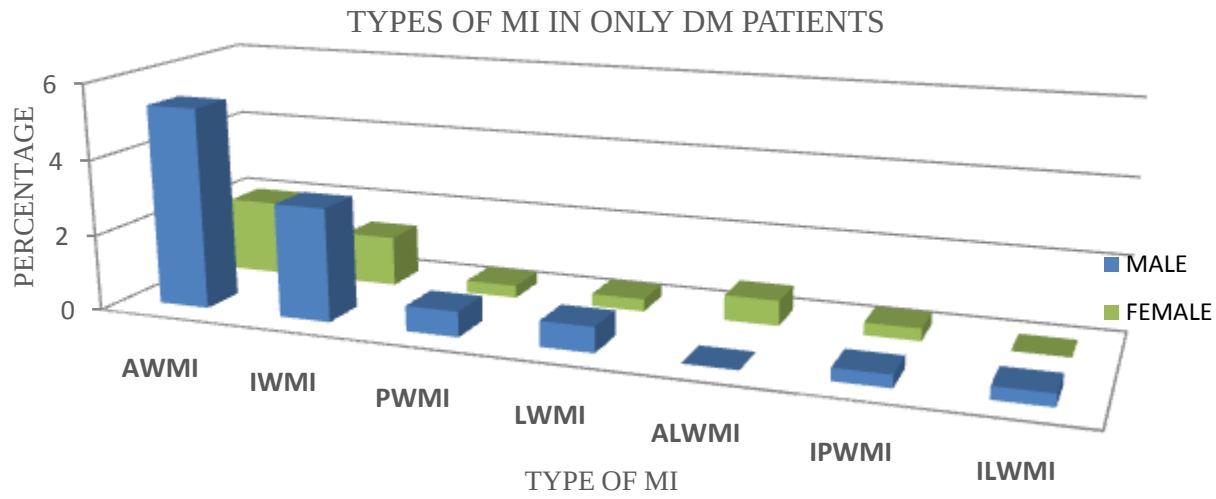
4. TYPES OF MI IN ONLY DM PATIENTS

Out of 300 patients 46 patients having only Diabetes without HTN. In these males (31) were more affected and females (15) were affected. The most of patients were exposed to AWMI (27) especially males (16) were more affected, and the least no. of patients were exposed to ILWMI.

Table -6

	AWMI	IWMI	PWMI	LWMI	ALWMI	IPWMI	ILWMI	TOTAL
MALE	16(5.33%)	9(3%)	2(0.67%)	2(0.67%)	0	1(0.33%)	1(0.33%)	31(10.33%)
FEMALE	6(2%)	4(1.33%)	1(0.33%)	1(0.33%)	2(0.67%)	1(0.33%)	0	15(5%)
TOTAL	22(7.33%)	13(4.33%)	3(1%)	3(1%)	2(0.67%)	2(0.67%)	1(0.33%)	46(15.33%)

Fig - 4



5 .TYPES OF MI IN COMBINATION WITH HTN & DM PATIENTS

Out of 300 patients 84 patients having combination of Diabetes and HTN. In these males (49) were more affected and females (35)were affected. The most of patients were exposed to AWMI (39) especially males (22) were more affected, followed by exposed to IWMI (31),and the least no. of patients were exposed to ALWMI (1).

Table - 7

	AWMI	IWMI	PWMI	LWMI	ALWMI	IPWMI	ILWMI	TOTAL
MALE	22(7.33%)	20(6.67%)	2(0.67%)	2(0.67%)	0	1(0.33%)	2(0.67%)	49(16.33%)
FEMALE	17(5.67%)	11(3.66%)	0	1(0.33%)	1(0.33%)	5(1.67%)	0	35(11.67%)
TOTAL	39(13%)	31(10.33%)	2(0.67%)	3(1%)	1(0.33%)	6(2%)	2(0.67%)	84(28%)

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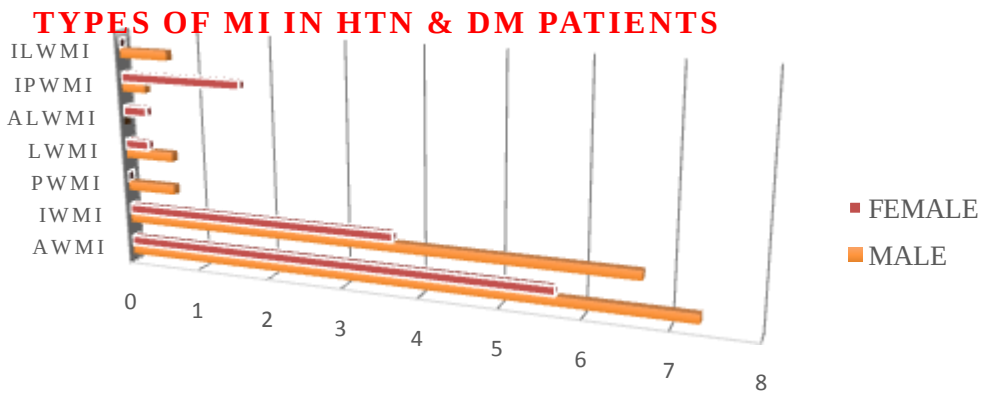
Fig – 5



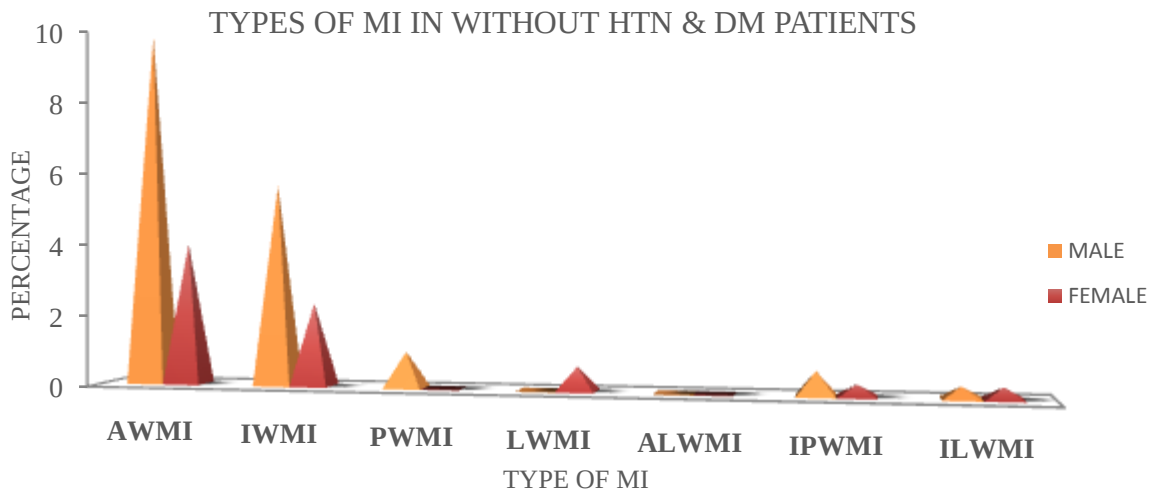
6. TYPES OF MI IN WITHOUT HTN AND DM

Out of 300 patients 76 patients without HTN and Diabetes. In these males (53) were more affected and females (23) were affected. The most of patients were exposed to AWMI (42) especially males (30) were more affected, followed by exposed to IWMI (24),and the least no. of patients were exposed to ALWMI (0).

Table – 8

GENDER/ TYPES OF MI	AWMI	IWMI	PWMI	LWMI	ALWMI	IPWMI	ILWMI	TOTAL
MALE	30(10%)	17(5.67%)	3(1%)	0	0	2(0.67%)	1(0.33%)	53(17.67%)
FEMALE	12(4%)	7(2.33%)	0	2(0.67%)	0	1(0.33%)	1(0.33%)	23(7.67%)
TOTAL	42(14%)	24(8%)	3(1%)	2(0.67%)	0	3(1%)	2(0.67%)	76(25.34%)

Fig – 6



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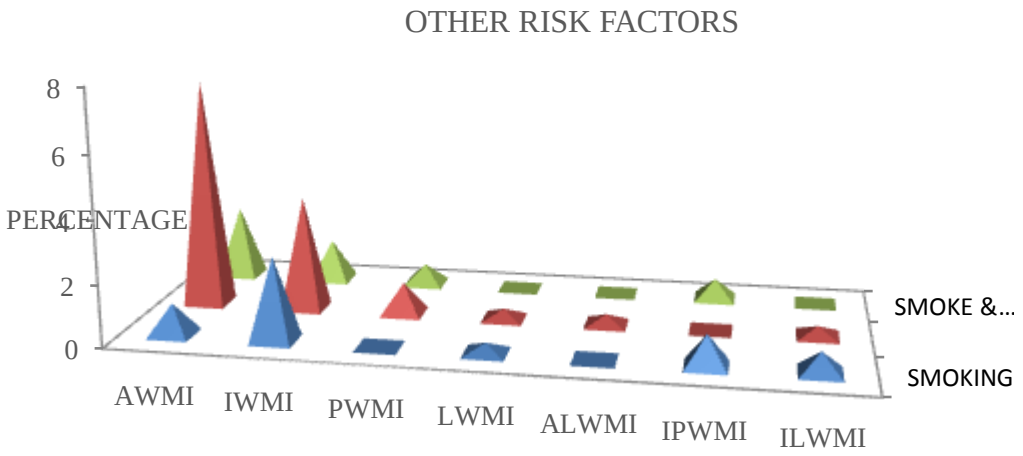
7. OTHER RISKFACTORS

Out of 300 patients only 17 no. of patients having habit of Smoking, the highest no. of patients (8) having IWMI and least no. of patients having PWMI and ALWMI. Only 39 patients having habit of Alcohol, the highest no. of patients were exposed to AWMI (22) and least to IPWMI. Only 15 patients having habit of Smoking and Alcohol, the highest no. of patients (7) exposed to AWMI and least to LWMI, ALWMI and ILWMI.

Table – 9

	AWMI	IWMI	PWMI	LWMI	ALWMI	IPWMI	ILWMI	TOTAL
SMOKING	3(1%)	8(2.67%)	0	1(0.33%)	0	3(1%)	2(0.67%)	17(5.67%)
ALCOHOL	22(7.33%)	11(3.67%)	3(1%)	1(0.33%)	1(0.33%)	0	1(0.33%)	39(13%)
SMOKING AND ALCOHOL	7(2.33%)	4(1.33%)	2(0.67%)	0	0	2(0.67%)	0	15(5%)

Fig – 7



V. DISCUSSION

Myocardial Infarction is a common cardiovascular disease in now adays. This study provides myocardial infarction patients to get which type of specific myocardial infarction. In six months study the response among 300 patients.

5.1Gender

Men tend to have heart attacks earlier in life than women. Women's rate of heart attack increases after menopause but does not equal men's rate. Even so, heart disease is the leading cause of death for both men and women. Identification and management of the Standard Modifiable Cardiovascular Risk Factors.

Of total study population, Male 185 (61.7%) were dominant over Females 115 (38.3%). In prognostic study of diabetes mellitus and hypertension for mid-term outcome of patients with acute myocardial infarction who underwent percutaneous coronary intervention, a total of 300 patients males were more affected.

5.2 Age

Advanced age is associated with an increased mortality in acute myocardial infarction. The mechanism by which increasing age contributes so dramatically to mortality is unknown. About 80% of heart disease deaths occur in people aged 65 or older.

In total patients 40-49 years (17.33%) male patients were more affected than other age group of the patients.

5.3 Patients having only HTN

Both systolic and diastolic hypertension increase the risk of a myocardial infarction. It is major risk factor of causing atherosclerosis in coronary blood vessels, result in heart attack or myocardial infarction. Hypertension and myocardial infarction are closely linked. Several mechanisms can account for the increased coronary risk in hypertensive patients. Hypertension accelerates the effects of atheroma, increases shear stress on plaques, exerts adverse functional effects

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on the coronary circulation, and impairs endothelial function and control of sympathetic tone. reported that in Argentine population, hypertension is a strong and independent risk factor for acute myocardial infarction. The control of hypertension with strict compliance of proper medication and adoption of lifestyle modifications reduce the risk of myocardial infarction significantly.

In total population, whose patients having only hypertension – the females (8.67%) having high risk for Anterior Wall Myocardial Infarction.

5.4 Patients having only DM

Type 2 diabetes mellitus is on the verge of becoming a pandemic in India. As type 2 diabetes shares several risk factors in common with coronary artery disease (CAD), such as age, hypertension, dyslipidemia, obesity, physical inactivity and stress, an increase in the prevalence of diabetes indirectly implicates an escalating risk of CAD as well. Diabetes increases risk of coronary heart disease (CHD) by two to four times. Patients with diabetes bear greater risk of atherosclerotic vascular disease in the heart as well as in other vascularized areas. It is also reported that plaques are more vulnerable to rupture among patients with diabetes.

It is also reported that plaques are more vulnerable to rupture among patients with diabetes. The protective female gender effect is lost in diabetic subjects, and indeed, women with diabetes are possibly more prone to develop CAD than men with diabetes. Diabetes increases the risk of myocardial infarction because it increases the rate of atherosclerotic progression and adversely affects the lipid profile and facilitates formation of atherosclerotic plaque. Diabetes is also a risk factor for myocardial infarction case fatality.

In total patients, patients having only diabetes – the males (5.33%) more affected due to AWMI.

5.5 Patients with HTN and DM

The study of population, the patients having hypertension and diabetes – the males (7.33%) was more affected due to AWMI.

5.6 Patients without HTN and DM

The mechanism is unknown. In total patients, nothing having hypertension and diabetes – the males (10%) were more affected due to AWMI.

5.7 Other risk factors

5.7.1 Alcohol

Alcohol consumption is associated with an acutely higher risk of myocardial infarction in the subsequent hour among people who do not typically drink alcohol daily. There is consistent evidence that moderate habitual alcohol consumption is associated with a lower risk of cardiovascular events in subsequent months and years and that heavy episodic drinking is associated with higher cardiovascular risk.

5.7.2 Smoking

Smoking is considered to be strong risk factor of myocardial infarction, premature atherosclerosis and sudden cardiac death. Smoking results in early STEMI especially in otherwise healthier patients. Cigarette smoking increases the risk for AMI by multiple and complex mechanisms. With respect to atherogenesis, smoking increases serum LDL cholesterol and triglyceride concentrations and reduces serum HDL-cholesterol. Furthermore, cigarette smoke promotes free radical damage to LDL, leading to accumulation of oxidized LDL-cholesterol within the arterial wall.

The study of population, alcohol consumption patients have high risk for AWMI, than other types of myocardial infarction.

VI. CONCLUSION

- In this study we documented, the ratio between males and females. Who are most affected and due to which type of myocardial infarction.
- We observed males are more affected than females.
- 40-49 age group population more affected.
- All categories of patients having high risk to AWMI.

	AWMI	IWMI	PWMI	LWMI	ALWMI	IPWMI	ILWMI
HTN	M(7.66%) F(8.67%)	M(5.33(%) F(3.67%)	M(0.67%) F(1%)	M(0.33%) F(0%)	M(0.66%) F(0.66%)	M(1%) F(1%)	M(0.67%) F(0%)
DM	M(5.33%) F(2%)	M(3%) F(1.33%)	M(0.67%) F(0.33%)	M(0.67%) F(0.33%)	M(0%) F(0.67%)	M(0.33%) F(0.33%)	M(0.33%) F(0%)

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HTN & DM	M(7.33%) F(5.67%)	M(6.67%) F(3.66%)	M(0.67%) F(0%)	M(0.67%) F(0.33%)	M(0%) F(0.33%)	M(0.33%) F(1.67%)	M(0.67%) F(0%)
NO HTN & DM	M(10%) F(4%)	M(5.67%) F(2.33%)	M(1%) F(0%)	M(0%) F(0.67%)	M(0%) F(0%)	M(0.67%) F(0.33%)	M(0.33%) F(0.33%)

Table - 10

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