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# Study of Clinical and Biochemical Profile of Metabolic Syndrome in Acute Myocardial Infarction

Dr. H.P. Paliwal[a], Dr. Navreet Kaur[b], Dr. Ankit Jain[c], Dr. Aakriti Vij[d]
[a] *Professor Department of medicine, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan*
[b,c,d] *PG Resident Department of medicine, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan*
*Corresponding Author: Dr. Navreet Kaur*

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## I. Introduction

**THE METABOLIC SYNDROME (MetS):**

The metabolic syndrome (insulin resistance syndrome, syndrome X) consists of a constellation of metabolic abnormalities (central obesity, low HDL-C (high-density lipoprotein cholesterol), hypertriglyceridemia, hyperglycemia and hypertension) that confer an increased risk of Cardiovascular Disease (CVD) and Diabetes Mellitus (DM)[1]. These risk factors, when present together, increase the risk of cardiovascular disease substantially, because their combined effects are multiplicative rather than additive [1].

It is estimated that people with metabolic syndrome has double the risk of mortality and three times likelihood of developing heart attack or stroke compared with people without the syndrome. People with metabolic syndrome have five times more risk of developing diabetes mellitus. They would add to the 230 million people worldwide who already have diabetes mellitus, one of the most common chronic diseases worldwide and the fifth leading cause of death in the developed world. Metabolic syndrome is now considered as driving force for cardiovascular disease (CVD) epidemic due to clustering of cardiovascular disease risk factors.

This study has been undertaken to assess and analyse the prevalence of metabolic syndrome and its various components in patients with acute Myocardial Infarction.

## II. Aims And Objectives

1. To assess the various components of metabolic syndrome in patients with acute myocardial infarction.
2. To study the prevalence of metabolic syndrome in patients with acute myocardial infarction admitted to Mahatma Gandhi Hospital, Jaipur

## III. Materials And Methods

It is a Hospital based cross sectional observational study conducted during period of January 2017 to June 2018 in CCU/ICU of Mahatama Gandhi Medical College & Hospital, Jaipur. Written and inform consent was obtained from all participants before enrolment into the study and Institute Ethics Committee approval was obtained before start of study. This study was conducted from January 2017 to June 2018 and all the cases of acute myocardial infarction admitted in this period was included in study after considering inclusion and exclusion criteria.Data was collected by using pre-tested proforma meeting the objectives of the study.

**INCLUSION CRITERIA**:

**(1) Patients diagnosed with acute myocardial infarction (MI) based on WHO Criteria**
**(2) Patients more than 18 years of age**

**EXCLUSION CRITERIA**:

**(1) Patients with non cardiac chest pain.**
**(2) Patients less than 18 years of age**
**(3) Patients with chronic stable angina and unstable angina.**

**(A)Diagnosis of myocardial infarction (MI) based on WHO (Category A) Definition and Diagnostic criteria for MI (2008-09 revision)[79]:**

This definition is same as as the **ESC/ACC/AHA/WHF definition for MI**:

1. **Typical rise and fall of biochemical markers of acute MI** (Troponin-T, Serum CK-MB, Serum LDH, SGOT)- preferably Troponin

**Plus at least one of the following**:

**a**. **Symptoms of ischaemia** (include various combinations of chest, upper extremity, jaw or epigastric discomfort with exertion or at rest; the discomfort usually lasts ≤20 min, often is diffuse, not localized, not positional, not affected by movement of the region and it may be accompanied by dyspnoea, diaphoresis, nausea or syncope);

**b**. **ECG changes** indicative of new ischaemia [new ST-T changes or new left bundle branch block (LBBB) ]

**c. Development of pathological Q waves** in the ECG

**d**. **Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality.**

## IV. Observations And Results

**Table 1: Prevalence of Metabolic Syndrome in Acute MI**

| PATIENTS | Number | % |
|---|---|---|
| Patients having metabolic syndrome | 74 | 48.68% |
| Patients not having metabolic syndrome | 78 | 51.32% |
| Total No. of patients of Acute Myocardial Infarction | 152 | 100.0% |

Out of 152 patients of acute myocardial infarction**, 74** patients were found to have metabolic syndrome as per modified NCEP-ATP III criteria**. Prevalence of metabolic syndrome in acute MI in our study was found to be 48.68%.**

**Table 2: Age Wise Prevalence of Metabolic Syndrome**

| Age Group in Years | MI with Metabolic Syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL |
|---|---|---|---|
| 35-44 years | 4 33.33% | 8 66.7% | 12 |
| 45-54 years | 20 54.05% | 17 45.95% | 37 |
| 55-64 years | 27 49% | 29 51% | 56 |
| 65-74 years | 13 43.3% | 17 56.7% | 30 |
| 75-84 years | 9 60% | 6 40% | 15 |
| ≥85 years | 1 50% | 1 50% | 2 |
| **TOTAL** | 74 | 78 | 152 |

Maximum prevalence of metabolic syndrome in our study was in age group of 75-84 years followed by 45-54 years of age group. In age group of 55-64 years and 65-74 years the prevalence is 49% and 43.3% respectively. The findings in our study are consistent with result of other studies.

**Table 3: Age Wise Distribution of Metabolic Syndrome in Acute MI**

| Age Group in Years | MI with Metabolic Syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL |
|---|---|---|---|
| 35-44 years | 4 5.4% | 8 10.25% | 12 |
| 45-54 years | 20 27.02% | 17 21.79% | 37 |
| 55-64 years | 27 36.48% | 29 37.17% | 56 |
| 65-74 years | 13 17.56% | 17 21.79% | 30 |
| 75-84 years | 9 12.16% | 6 7.69% | 15 |
| ≥85 years | 1 1.35% | 1 1.28% | 2 |
| **TOTAL** | 74 | 78 | 152 |
| **Mean± s.d** | 58.36±11.14 | 57.26±11.45 | |

**Table 4: Gender and Metabolic Syndrome**

| Gender | MI with metabolic syndrome (n=74) | MI without Metabolic Syndrome (n=78) | Total |
|---|---|---|---|
| Female | 21 28.38% | 25 67.9% | 36 |
| Male | 53 71.62% | 53 67.9% | 106 |
| Total | 74 | 78 | 152 |

p>0.05 NS- Not Significant

Chi-square ($\chi^2$) test showed that there was no significant association between gender and metabolic syndrome of the patients (p>0.05). In our study, 69.74% of the patients were male and 30.26% of the patients were female. Males were predominant in both metabolic syndrome and non- metabolic syndrome groups (71.62 % and 67.94% respectively).

**Table 5: Symptoms at the Time of Presentation and Metabolic Syndrome**

| Symptoms | MI with Metabolic Syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL | p- value |
|---|---|---|---|---|
| **Chest Pain** | 6283.78% | 67 85.89% | 129 84.86% | **>0.05 NS** |
| **Sweating** | 48 64.86% | 39 50% | 87 57.23% | **>0.05 NS** |
| **Shortness of breath** | 44 59.45% | 51 65.38% | 95 62.5% | **>0.05 NS** |
| **Palpitation** | 19 25.67% | 21 26.92% | 40 26.31% | **>0.05 NS** |
| **Vomiting** | 14 18.91% | 17 21.79% | 31 20.39% | **>0.05 NS** |
| **Syncope** | 7 9.45% | 3 3.84% | 10 6.57% | **<0.05 S** |

NS- Not Significant, S – Significant

P value of patients with syncope in metabolic syndrome with acute MI was less than <0.05 hence there was significant difference as compared with patients of acute MI without metabolic syndrome. But there was no significant difference in other symptoms. (p>0.05).

In both groups, the **most common symptom at presentation was chest pain** (83.78 % and 85.89 % respectively). The second most common symptom in the metabolic syndrome group was sweating (64.86%). The second most common symptom in the non-metabolic syndrome group was shortness of breath (62.5%).

**Risk Factors:**

**Table 6: Past history of Diabetes Mellitus (DM) and metabolic syndrome:**

| Past h/o DM | MI with Metabolic Syndrome (n=74) | MI without Metabolic syndrome (n=78) | TOTAL |
|---|---|---|---|
| **Yes** | 52 70.27% | 22 28.20% | 74 |
| **No** | 22 29.72% | 56 71.7% | 78 |
| **TOTAL** | 74 100% | 78 100% | 152 |

**$\chi^2$ =29.10; p=0.000001; S- Significant**

Chi-square ($\chi^2$) test showed that there was significant association between past history of DM and metabolic syndrome of the patients (p=0.000001). Among the patients with metabolic syndrome, past history of DM (70.27%) was significantly higher than those without metabolic syndrome (28.20%) [ p<0.001].

**Table 7: Past history of Hypertension and Metabolic syndrome:**

| Hypertension | MI with Metabolic Syndrome (n=74) | MI without Metabolic syndrome (n=78) | TOTAL |
|---|---|---|---|
| **Yes** | 49 66.2% | 15 19.23% | 64 |
| **No** | 25 33.8% | 63 80.7% | 88 |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.000001; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between past history of Hypertension and metabolic syndrome of the patients (p=0.000001). Among the patients with metabolic syndrome, past history of hypertension (HTN)- (66.2%) was significantly higher than those without metabolic syndrome (19.23%) [p<0.001].

**Table 8: Family history of Ischemic Heart Disease (IHD) and Metabolic syndrome**

| Family history of IHD | MI with Metabolic syndrome Yes (n=74) | MI without Metabolic syndrome No (n=78) | TOTAL |
|---|---|---|---|
| **Yes** | 32 43.24% | 20 25.64% | 52 |
| **No** | 42 56.75% | 58 74.35% | 100 |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.006; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between family history of IHD and metabolic syndrome of the patients (p=0.006). Among the patients with metabolic syndrome, family history of IHD (43.24%) was significantly higher than those without metabolic syndrome (25.64%) [p<0.01].

**Table 9: Chronic smoker and metabolic syndrome**

| Chronic smoker | MI with metabolic syndrome (n=74) | MI without metabolic syndrome (n=78) | TOTAL |
|---|---|---|---|
| **Yes** | 43 58.1% | 42 53.84% | 85 |
| **No** | 31 41.89% | 36 46.15% | 67 |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.47; NS- Not Significant

55.9 % of the patients of acute MI were found to be chronic smokers. Chi-square ($\chi^2$) test showed that there was no significant association between chronic smoking and metabolic syndrome of the patients (p=0.47).

**Table 10: Alcohol consumption and metabolic syndrome**

| Chronic Alcoholic | Metabolic Syndrome | | TOTAL |
|---|---|---|---|
| | Yes (n=74) | No (n=78) | |
| **Yes** | 11 14.8% | 24 30.76% | 35 23.02% |
| **No** | 63 85.13% | 54 69.23% | 117 76.97% |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.16; NS- Not Significant

Chi-square ($\chi^2$) test showed that there was no significant association between chronic alcohol consumption and metabolic syndrome of the patients (p=0.16).

**Table 11: FBS ≥ 100 mg/dl and metabolic syndrome:**

| FBS (mg/dl) | MI with Metabolic Syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL |
|---|---|---|---|
| **≥100** % | 63 85.13% | 24 30.765 | 87 57.23% |
| **<100** | 11 14.86% | 54 69.23% | 65 42.76% |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.00000001; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between FBS ≥ 100 mg/dl and metabolic syndrome of the patients (p=0.00000001).

**Table 12: SBP and metabolic syndrome:**

| SBP (mm Hg) | MI with Metabolic Syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL |
|---|---|---|---|
| **≥130** | 56 75.67% | 20 25.64% | 76 50% |
| **<130** | 18 24.32% | 58 74.35% | 76 50% |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.000001; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between SBP ≥130 mm Hg and metabolic syndrome of the patients (p=0.000001).

**Table 13: DBP and metabolic syndrome**

| DBP (mm Hg) | MI with Metabolic Syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL |
|---|---|---|---|
| **≥85** | 54 72.97% | 17 21.79% | 71 46.71% |
| **<85** | 20 27.02% | 61 78.2% | 81 53.25% |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.000001; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between DBP ≥ 85 mmHg and metabolic syndrome of the patients (p=0.000001).

**Table 14: Serum Triglycerides (TGs) and metabolic syndrome**

| TGs (mg/dl) | MI with Metabolic syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL |
|---|---|---|---|
| **≥150** | 60 81.08% | 17 21.79% | 77 50.65% |
| **<150** | 14 18.91% | 61 78.2% | 75 49.34% |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.000001; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between serum triglycerides ≥ 150 mg/dl and metabolic syndrome of the patients (p=0.000001).

**Table 15: Low HDL-C and metabolic syndrome in males**

| HDL (mg/dl) | MI with Metabolic syndrome (n=53) | MI without Metabolic Syndrome (n=53) | TOTAL |
|---|---|---|---|
| **<40**<br>Row %<br>Col % | 47 88.67% | 18 33.96% | 65 61.32% |
| **≥40**<br>Row %<br>Col % | 6 11.32% | 35 66.03% | 41 38.67% |
| **TOTAL**<br>Row %<br>Col % | 53 100% | 53 100% | 106 |

p=0.00001; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between HDL < 40 mg/dl and metabolic syndrome of the male patients (p=0.00001).

**Table 16: Low HDL –C and metabolic syndrome in females:**

| HDL (mg/dl) | MI with Metabolic syndrome (n=21) | MI without Metabolic Syndrome (n=25) | TOTAL |
|---|---|---|---|
| **<50**<br>Row %<br>Col % | 19 90.47% | 8 32% | 27 58.69% |
| **≥50**<br>Row %<br>Col % | 2 9.52% | 17 68% | 19 41.3% |
| **TOTAL**<br>Row %<br>Col % | 21 100% | 25 100% | 46 |

p=0.0007; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between low HDL-C and metabolic syndrome of the female patients (p=0.0007).

**Table 17: Body Mass Index (BMI) and metabolic syndrome**

| BMI (kg/m$^2$) | MI with Metabolic syndrome (n=74) | MI without Metabolic Syndrome (n=78) | TOTAL |
|---|---|---|---|
| **≥25** | 62 83.78% | 21 26.92% | 83 54.6% |
| **<25** | 12 16.21% | 57 73.08% | 69 54.39% |
| **TOTAL** | 74 100% | 78 100% | 152 |

p=0.000003; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between BMI ≥ 25 kg/m$^2$ and metabolic syndrome of the patients (p=0.000001).

**Table 18: Waist Circumference (WC) and metabolic syndrome in males**

| WC (cm) | MI with Metabolic syndrome (n=53) | MI without Metabolic Syndrome (n=53) | TOTAL |
|---|---|---|---|
| **≥90** | 36 67.92% | 8 15.1% | 44 41.5% |
| **< 90** | 17 32.08% | 45 84.9% | 62 58.4% |
| **TOTAL** | 53 100% | 53 100% | 106 |

p=0.000002; S- Significant

Chi-square ($\chi^2$) test showed that there was significant association between increased waist circumference and metabolic syndrome of the male patients (p=0.00001).

**Table 19: WC and metabolic syndrome in females**

| WC (cm) | MI with Metabolic Syndrome (n=21) | MI without Metabolic Syndrome (n=25) | TOTAL |
|---|---|---|---|
| **≥80** | 19 90.47% | 10 40% | 29 |
| **< 80** | 2 9.53% | 15 60% | 17 |
| **TOTAL** | 21 100% | 25 100% | 46 |

p=0.002; S- Significant

Chi-square ( $\chi^2$ ) test showed that there was significant association between WC ≥ 80 cm and metabolic syndrome of the female patients (p=0.0002).

**Table 20: Prevalence of Individual Components of Metabolic Syndrome in Patients of Acute MI with Metabolic Syndrome**

| Components of Metabolic Syndrome | Prevalence in Metabolic Syndrome (N=74) |
|---|---|
| Low HDL-C levels | 89.18% |
| FBS ≥ 100 mg/dl | 85.13 % |
| Increased Triglyceride Levels (≥ 150 mg/dl) | 81.08 % |
| SBP ≥ 130 mm Hg | 75.67 % |
| DBP ≥ 85 mm Hg | 72.97 % |
| Elevated WC | 74.23% |

Low HDL-C (90.8 %) was the most prevalent component in patients having metabolic syndrome, followed by Fasting Blood Sugar ≥100 mg/dl (86.2 %), Hypertriglyceridemia (81.5%), Hypertension (75.4 %) and Elevated Waist Circumference (72.3 %).

**Table 21: STEMI and Metabolic Syndrome**

| Diagnosis | Metabolic Syndrome | | TOTAL |
|---|---|---|---|
| | Yes (n=74) | No (n=78) | |
| NSTEMI | 15 20.27% | 28 35.89% | 43 28.28% |
| STEMI | 59 79.73% | 50 64.1% | 109 71.72% |
| TOTAL | 74 100% | 78 100% | 152 |

Out of 74 cases of Acute MI, ST- Elevated MI (STEMI) was found in 59 cases (79.73%). STEMI was found in 15 cases (20.27%) of MI with metabolic syndrome.

## V. Discussion

**This was a hospital-based, cross-sectional observational study**. 152 cases of acute MI admitted to the CCU of Mahatma Gandhi Hospital, Jaipur were included in study keeping in mind the inclusion and exclusion criteria during the period of January 2017 to June 2018.
The observations made in the study are discussed here:

**Table 22: Prevalence of Metabolic Syndrome in Acute MI**

| Study | Prevalence |
|---|---|
| Ninomiya et al [2]. (2004) | 41.5 % |
| Zeller M et al [4]. (2005) | 46 % |
| Pandey S. et al [6] (2009) | 26.19 % |
| Prasad SB [8] (2010) | 49 % |
| Babic Z et al [12]. (2011) | 49.8 % |
| Sarkar S [13] (2013) | 47.14 % |
| Tugba Kemaloglu Oz et al[17]. (2017) | 46.8% |
| Our study | 48.68% |

Prevalence of metabolic syndrome (as defined by revised NCEP ATP III criteria) in Acute MI was 48.68 % in our study, which is comparable to the prevalence rates of 46 %, 49 %,49.8 %, 46.8%and 47.14 % found in studies conducted by Zeller et al., Prasad SB, Babic Z et al, Tugba Kemaloglu Oz et al and Sarkar S respectively.

Maximum prevalence of metabolic syndrome in our study was in age group of 75-84 years followed by 45-54 years of age group. In age group of 55-64 years and 65-74 years the prevalence is 49% and 43.3% respectively.The findings in our study are consistent with the result of other studies.

As per above findings it is clear that metabolic syndrome according to NCEP ATP III criteria, is very common among patients with coronary artery disease /myocardial infarction, because almost 1 in 2 patients had metabolic syndrome and that it is associated with advanced vascular damage. Our study confirms the high prevalence of metabolic syndrome in patients with MI, suggesting that the metabolic syndrome has clinical utility in identifying patients at increased risk of AMI.

**Table 23: Age and Sex Distribution**

| STUDY | MEAN AGE (in years) | |
|---|---|---|
| | MI with MetS | MI without MetS |
| Levantesi G et al [3]. | 59.0 ± 10.8 | 58.6 ± 10.3 |
| Zeller M et al [4]. | 63 | 70 |
| Schwartz G et al [5]. | 65 ± 11 | |
| Prasad SB [8] | 62 ± 13.5 | 56.8 ± 11.6 |
| Pandey S. et al [6]. | 60.69 ± 11.68 | 61.40 ± 10.09 |
| Our study | 58.36 ± 11.14 | 57.26 ± 11.45 |

In our study, myocardial infarction was more in the 55-64 yrs age group (36.48% in the metabolic syndrome group and 37.17% in the non-metabolic syndrome group). There was no significant difference in the mean age of presentation between the two groups. ($p > 0.05$)

The mean age of acute MI with metabolic syndrome in our study was almost the same (59.73 yrs) compared to the mean age found in studies conducted by Levantesi G (59.0 yrs).

**Table 24: Gender distribution of metabolic syndrome patients**

| Study | Male | Female |
|---|---|---|
| Zeller M et al [4]. | 63 % | 37 % |
| Schwartz G et al [5]. | 55 % | 45 % |
| Levantesi G et al[3] | 85 % | 15 % |
| Pandey S. et al [6] | 63.6 % | 36.3 % |
| Prasad SB [8] | 67 % | 33 % |
| Sarkar S [13] | 54.54 % | 45.45 % |
| Our study | 71.62 % | 28.38 % |

71.62% of the patients of MI with MetS were male and 28.38% of the patients were female, which is similar to the findings in the studies conducted by Zeller et al, Pandey S et al and Prasad SB.

**RISK FACTORS**

In our study, past history of diabetes mellitus, hypertension and family history of IHD was more in patients with MetS compared to patients without MetS, which was statistically significant. In our study no substantial difference in the association between alcohol consumption, smoking and metabolic syndrome was found.

**Table 25: Risk Factors**

| | Zeller M et al [4]. | Prasad SB [8] | Our Study |
|---|---|---|---|
| Past history of DM | 48 % | 29 % | 70.27 % |
| Past history of HTN | 79% | 71 % | 66.2 % |
| Family History of IHD | 32 % | 29 % | 43.24 % |
| Chronic smoker | 23 % | 29 % | 58.1% |

Our study showed a higher prevalence of known cases of diabetes mellitus and family history of IHD among patients having metabolic syndrome, compared to other studies.

**Table 26: Prevalence of Various Components of Metabolic Syndrome in Patients of Acute MI with MetS:**

| STUDY | FBS ≥ 100 g/dl | BP ≥ 130/85 mm Hg | Elevated Triglycerides (TG ≥ 150 mg/dl) | Low HDL-C | Increased Waist Circumference |
|---|---|---|---|---|---|
| Zeller M et al [4]. | 66.5 % | 78.6% | | | |
| Schwartz G et al [5]. | | 90 % | | 88 % | 76 % |
| Al-Aqeedi et al [16]. | 89.8 % | 40.4 % | 61.7 % | 94.1 % | 81.8 % |
| Ninomiya et al [2]. | | 48.2 % | 43.2 % | 45 % | 51 % |
| Pandey S et al [6]. | 77.2 % | 95.45 % | 59.09 % | 77.2 % | 63.6 % |
| Our study | 85.1 % | 75.7 % | 81.1 % | 89.9 % | 74.32 % |

In our study, the most prevalent component of metabolic syndrome was low HDL-C (89.2%)followed by increased fasting blood sugar (85.13%), increased serum triglycerides (81.1%), hypertension (75.7%),and elevated waist circumference (74.3 %). This result is similar to the one obtained by Pandey S et al. and Al-Aqeedi et al. who also found low HDL-C to be the most prevalent component along with increased FBS.

The mean value of Fasting Blood Sugar (FBS), Blood Pressure (SBP & DBP), Serum Triglycerides was found to be higher in our study compared to other studies. The mean values of HDL-C and Waist Circumference (WC) was found to be lower in our study compared to other studies.

**SALIENT FINDINGS**

- Our study was a cross-sectional observational, hospital-based, study. In our study, 152 cases of Acute Myocardial Infarction (AMI) were studied during the period of Jan 2017 to June 2018), for the prevalence of metabolic syndrome using revised NCEP-ATP III criteria.
- Out of 152 cases, 74 cases were found to have metabolic syndrome. Hence, there was high prevalence of metabolic syndrome in acute MI in our study (48.68%).
- The age of the patients ranged from 34 to 88 years with a median age of 57 yrs.
- Maximum prevalence of metabolic syndrome in our study was in age group of 75-84 years followed by 45-54 years of age group. Male cases predominated in both groups (with and without metabolic syndrome groups) 71.62 % and 67.9 % respectively.
- Chest pain was the most common symptom in both the groups (83.78% and 85.89 % respectively). In metabolic syndrome patients, second most common symptom was sweating (64.86 %). In patients without metabolic syndrome, second most common symptom was shortness of breath (65.38 %). The proportion of patients with syncope was significantly higher among patients with metabolic syndrome.
- 70.27 % of metabolic syndrome patients were found to have past history of diabetes mellitus. 66.2 % of metabolic syndrome patients were found to have past history of hypertension. The presence of past history of diabetes mellitus and hypertension was associated with higher risk of development of metabolic syndrome.
- 43.24% of metabolic syndrome patients were found to have family history of Ischemic Heart Disease (IHD). This association was found to be statistically significant.
- 58.1 % of metabolic syndrome patients were found to be chronic smokers and 14.8 % were found to be chronic alcoholics.
- The body mass index (BMI) of $\geq$ 25 kg/m$^2$ was found to be present in 83.78 % of patients with metabolic syndrome.
- The mean values of Fasting Blood Sugar (FBS), Blood Pressure (SBP & DBP), Serum Triglycerides was found to be higher in our study compared to other studies. The mean values of HDL-C and Waist Circumference (WC) were found to be lower in our study compared to other studies.
- 79.73% of cases of acute MI were found to have STEMI and 22.27% were found to have NSTEMI in metabolic syndrome.
- Among the components of metabolic syndrome, low HDL-C was the most prevalent component among MetS patients (89.18 %). Increased FBS was the next most prevalent component (85.13 %) followed by hypertriglyceridemia (81.08%) and elevated waist circumference (74.32 %)

## VI. Conclusion

There is high prevalence of metabolic syndrome and its individual components in patients of acute myocardial infarction, suggesting that the metabolic syndrome has clinical utility in identifying patients at increased risk of Acute MI.

Low HDL-C was the most prevalent component among patients having metabolic syndrome, followed by increased fasting blood sugar levels.

Smoking was found to be associated with high incidence of myocardial infarction. Hence, smoking is a major preventable risk factor for the development of cardiovascular disease.

To conclude, our findings clinch the importance of the metabolic syndrome as a significant risk factor for cardiovascular disease, particularly myocardial infarction. This reaffirms the need to develop stringent strategies for controlling this syndrome and also its individual components.

Hence, prevention, detection and optimal management of metabolic syndrome is likely to reduce cardiovascular risk and early management will save the precious human lives.

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