Original Article

Frequency of Metabolic Syndrome in Patients of Acute ST Segment Elevation Myocardial Infarction

Metabolic Syndrome in Acute ST Segment Elevation MI

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ABSTRACT

Objective: To determine the frequency of metabolic syndrome (MS) in patients with acute ST segment elevation myocardial infarction (STEMI)**.**

Study Design: Cross-Sectional study.

Place and Duration of Study: This study was conducted at the Department of Cardiology, Bahawal Victoria Hospital (BVH), Bahawalpur from March 2018 to tAugust 2018.

Materials and Methods: A total of 380 patients, in the age range of 30 –70 years with Acute STEMI were included in the study. Only the patients fulfilling the inclusion criteria were included in the study. In this study, five components of MS were assessed after the written consent of the patients using the standard state of the art techniques.

Results: Statistical analysis reveals that patients 47.36% were between 51 to 60 years of age with male to female ratio of 2:1. MS was found in 43.42% patients with 42.0% male and 46.15% female patients and incidence were increasing with passing years. The mean waist circumference was 89.12±6.43 in males and 93.23±11.65 in females, mean serum triglycerides was 146.11±27.77 in males and 148.66±28.54 in females, mean serum HDL Cholesterol was 41.17±6.32 in males and 50.94±4.55 in females, mean systolic blood pressure was 130±10 in males and 120±10 in females and mean diastolic blood pressure was 90±5 in males and 80±10 in females, mean fasting blood sugar was 114.11±15.76 in males and 108.56±20.43 in females.

Conclusion: This study concludes that there is a high frequency of metabolic syndrome (MS) in acute STEMI patients in our population with hypertension and diabetes mellitus as the major components of MS.

Key Words: Cardiovascular diseases (CVD), Myocardial Infarction (MI), Metabolic Syndrome (MS).

Citation of articles: Iqbal MU, Khalid MS, Ahmed S, Mumtaz I, Iqbal M, Kousar R. Frequency of Metabolic Syndrome in Patients of Acute ST Segment Elevation Myocardial Infarction. Med Forum 2019;30(8):77-81.

INTRODUCTION

Cardiovascular diseases (CVD) are one of the prominent cause of demise in the world, especially in industrialized countries.[1]Among the cardiovascular diseases, Ischemic heart disease (IHD) is the most predominantexpression including silent ischemia (SI), acute coronary syndromes (ACS), and stable angina pectoris (SAP).[2]

IHD results due to the reduced flow of the blood in the arteries of the heart. The reduced blood flow is caused by the deposition of plaque in the arteries of the heart. The reduction of the blood flow results in reduced oxygen flow to the heart muscles. The current CVD models focus on the interventions through angiographic results which are supportive in finding CVD prognosis and progression. The literature review reveals that the threat of MI is approximately completely based on the modifiable CV risk factors like psychosocial stress, smoking, dyslipidemia, HTN, DM, and poor diet.[6-9] Most of the above mentioned factors are caused by the Metabolic Syndrome (MS).

Definition of the MS is based on obesity and any two of the following: "raised triglycerides, reduced HDL cholesterol, raised blood pressure, and raised fasting plasma glucose (FPG > 100mg/dl (5.6 mmol/L), or previously diagnosed type 2 diabetes"[10].

The mechanisms of the MS are very complex and therefore the pathophysiology of the MS is highly complex and is not completely known yet. However, the most common contributing factors are age, obesity, sedentary habits, and resistance to insulin. According to some authors, stress may also be another important contributing factor. The other important factors reported in the literature are weight, genetics,[10,11] endocrine disorders and lifestyle.[12]

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Received: July, 2019
Accepted: July, 2019
Printed: August, 2019

MS stimulates coronary heart disease (CHD)by raising the levels of the thrombogenicity due to increase in adipokine and plasminogen activator type 1 levels.[12-16]MS is composed of a number of modifiable disorder, therefore, controlling the modification of these disorders will help in improving the morbidity and mortality. As MS has racial and ethnic variation,[17,18] and secondly the local and the international studies were done on the same topic included both STEMI and NSTEMI and no stratification was done hence there is still no clarity. Therefore, this research was aimed to evaluate the frequency of MS in patients presenting with acute STEMI, so that a policy could be designed to raise public awareness to modify these factors and improve the mortality and morbidity of community.

MATERIALS AND METHODS

The presented study is a cross-sectional study which is conducted at the Department of Cardiology, Cardiac Complex, Bahawalpur from the 1st March 2018 to the 31st August 2018.The aim of the underlying research was to explore the frequency of MS in patients with acute STEMI. In this study sample size, comprised of total 380 cases which was determined on the basis 95% confidence level, and limiting the margin of error to the 5%. The expected prevalence of MS was taken as 60%. The used sampling technique is "Non-probability consecutive sampling". Acute STEMI was defined as**"**ST segment elevation of >1mm in limb leads and >2mm in precardial leads".

The criteria provided for the definition of the MS and/or insulin resistance syndrome (IRS) according to the international standards[3-7]is applied in this study.

The criteria for including or excluding the patients in the study are presented below:

Inclusion Criteria:

1. All patients who will be diagnosed on admission as Acute ST segment elevation Myocardial infarction (as per operational definitions).
2. Age limits for both genders are 30 to 70 years.

Exclusion Criteria:

1. Patients of chronic renal failure and cirrhosis of the liver
2. Hemodynamically unstable patient/Systolic blood pressure<90 mmHg.
3. Cushing's disease.
4. Previous history of ischemic heart disease
5. Failure to get informed consent about study
6. Pregnant females

The total number of 380 patients with acute STEMI was selected based on the mentioned criteria. The basic information which includes name, age, gender and address were recorded of every patient using the first part of the prescribed form along with a written consent of the patient to be included in the study.In the second part of the prescribed form, all the variable of the study were recorded. In the first step of measurement of the data,five components of MS were measured using the standard techniques.

Results were statistically analyzed using the state of the art statistical analysis tool "SPSS v16.0". Results are presented as mean value and deviation from the mean value i.e. standard deviation for quantitative variables whereas the qualitative variables are presented in the form of percentages. Stratifications were applied to control the impact of modifiers like age and gender. The Chi-square test is applied after the stratification to compute the impacts on the results. In this research, a p-valueis significant if ≤ 0.05.

RESULTS

Statistical analysis of the results is presented in the tables I-6. In this study, the patient's age ranges from 30 to 70 years where the mean value of age is 53.87 ± 10.42 years. The analysis shows that a 47.36% patients age ranges 51 – 60 years which is also presented in Table I. Among the 380 patients, 65.79% were male and only 34.21% were females which resulted in a ratio of

Table No.1: Age Distribution According to Gender (n=380)

Age Groups (years)	Male		Female		Total	
	No. of Patients	% age of Patients	No. of Patients	% age of Patients	No. of patients	% age of Patients
30-40	16	4.21	09	2.37	25	6.58
41-50	54	14.21	31	8.16	85	22.37
51-60	115	30.26	65	17.10	180	47.36
61-70	65	17.11	25	6.58	90	23.69
Total	250	65.79	130	34.21	380	100.0

Table No.2: Frequency of Individual Components of Metabolic Syndrome in Myocardial Infarction Patients (n=380)

Component	Male (n=250)		Female (n=130)		Total (n=380)	
	No.	%age	No.	%age	No.	%age
Central Obesity	141	56.4	75	57.69	216	56.84
Raised Triglycerides	85	34.0	50	38.46	135	35.53
Reduced HDL Cholesterol	100	40.0	55	42.31	155	40.79
Raised Blood Pressure	122	48.8	40	30.77	162	42.63
Raised Fasting Plasma Glucose	110	44.0	60	46.15	170	44.74

Table No.3: Descriptive Statistics for Different Variables

	Male (n=250)	Female (n=130)	Total (n=380)
Age (years)	53.67±10.09	55.39±10.76	53.87±10.42
Waist Circumference (cm)	89.12±6.43	93.23±11.65	91.10±8.98
Triglycerides (mg/dL)	146.11±27.77	148.66±28.54	147.30±28.10
HDL Cholesterol (mg/dL)	41.17±6.32	50.94±4.55	45.89±5.25
Blood Pressure (mmHg)	130±10/90±5	120±10/80±10	125±10/85±10
Fasting Glucose (mg/dL)	114.11±15.76	108.56±20.43	111.13±17.89

Table No.4: Frequency of Metabolic Syndrome in Different Age Groups (N=165)

Age Groups(years)	Frequency	Percentages
30-40	02	1.21%
41-50	22	13.33%
51-60	81	49.1%
61-70	60	36.36%
Total	165	100.0

Table No.5: %age of Patients with Metabolic Syndrome in Acute STEMI for Different Age Groups

Age Group (years)	No. of patients	Presence of Metabolic abnormality	
		No. of patients	%age
30-40	25	02	8.0
41-50	85	22	25.88
51-60	180	81	45.0
61-70	90	60	66.67

Table No.6: %age of Patients with Metabolic Syndrome According to Gender

Gender	No. of patients	Metabolic Syndrome			
		Present		Absent	
		No. of patients	%age	No. of Patients	%age
Male	250	105	42.0	145	58.0
Female	130	60	46.15	70	53.85
Total	380	165	43.42	215	56.58

2:1. MS was found in 165 (43.42%) patients, whereas there were no MS in 215 (56.58%) patients. Frequency of different components of MS has shown in Table 3. The mean waist circumference was 89.12±6.43 in males and 93.23±11.65 in females, mean serum triglycerides was 146.11±27.77 in males and 148.66±28.54 in females, mean serum HDL Cholesterol was 41.17±6.32 in males and 50.94±4.55 in females, mean systolic blood pressure was 130±10 in males and 120±10 in females and mean diastolic blood pressure was 90±5 in males and 80±10 in females, mean fasting blood sugar was 114.11±15.76 in males and 108.56±20.43 in females (Table 4).

Stratification on age resulted inthe highest MS in the age group of 51 – 60 years which are 49.1% followed by age group of 61 – 70 years which 36.36%. The age groups below 50 years show less MS frequency which is 13.33% in the age group of 41 – 50 years and only 1.21% in the age group of 30 – 40 years. The frequency of MS based on the stratification of the age is presented in Table 5**.** The %age of patients with MS in acute STEMI with respect to the age groups were shown in Table 6.

DISCUSSION

Diagnostic criteria of the MS have multiple directions due to non-availability of a "gold standard" diagnostic test which shows that still there is conceptual vagueness, and lack of clarity about pathophysiological processes which reflect the underlying "syndrome".

Many studies have been conducted in the literature aiming to study populations which are at high risk for CVDlike patients suffering from type 2 diabetes mellitus (DM) or hypertension. The results of these studies reveals high occurrence of MS ranging from 35 – 80%.[20,21]Similar results are reported in a cohort study in which more than 50% of patients who showed the symptoms of the CVD and underwent elective coronary angiography and showed conditions for CVD, also satisfied the criteria for MS.[22]Earlier to this study, Yasmin et al studied the frequency of MS in Pakistan however that study was based on the[23,24]NCEPATPIII criteria. With the new joint interim statement of IDF task force, it was important that the frequency of MS in IHD to be reviewed according to the current criteria. Therefore, the goal of the research was to determine the frequency of MS in patients with acute STEMI.

The mean age of patients in this study was 53.87 ± 10.42 years

which is in accordance with the research conducted by the Sandhu GA et al[22] and Ashraf T et al[25] however comparatively higher than the Danciu SC et al[8]. According to the literature acute MI is a more common disease of the male as compared to the female. In the underlying research, we also found a male high proportion as compared to the female where the observed ratio was 2:1 which is exactly in line with the previous studies[8,24,25]

In this study, MS was found in 43.42% patients, whereas there was no MS in 56.58% patients which is compatible and inline with previously researched in the similar area.[19,23-26] In this study, 50 patients (30.3%) had all components of MS alongwith abdominal obesity, and 115 (69.7%) patients had two or three components along with abdominal obesity.In a study by

Ashraf et al[25] 25.1% of patients had all components of MS along with abdominal obesity while 74.9% of patients had two or three components of MS along with abdominal obesity. Therefore, it can be acknowledged that the frequency of MS is higher in patients with acute MI.

Yasmin et al[24] reported the frequency of MS in cases of acute MI as 32% in men & 28% women whereas this study showed MS in 42.0% male and 46.15% female patients and incidence was increasing with passing years. Hassanin et al[9], Onat A et al[26,]and Wierzbicki AS et al[27] reported a similar result for Turkish and UK populations respectively.

In a meta-analysis of comprised of total 21 state of the art studies, frequency of the MS was found 23 – 46% with different levels of cardiovascular risk factors which is also in accordance the results obtained in our study.[28]

Among the individual components of MS, we have found raised fasting blood glucose to be the most common component (44.74%), followed by hypertension (42.63%). Sandhu GA et al[19] has also observed raised fasting blood glucose as the most common component in his study. This may be due to insulin resistance and hyperinsulinemia which is an important feature of this syndrome, suggesting that insulin itself is atherogenic.[19]Increased levels of triglyceride and decrease value HDL cholesterol were as solidinterpreter of vascular events as the presence of other components of MS in a potential study of patients with coronary artery disease determined by angiography.[29] In my study, these two factors were also observed as major risk factors for acute MI and were seen in 35.53% and 40.79% patients respectively. Raised serum triglycerides, increased small LDL particles and a reduced level of HDL cholesterol (HDL-C) consist of atherogenic dyslipidemia. Insulin resistance is a central patho-physiological process along with acquired factors such as excess body fat and physical inactivity.[30] Effective lifestyle change or if the required relevant pharmacological intervention can reduce the risk.

CONCLUSION

This study concludes that there is a high frequency of MS in acute STEMI patients in our population with hypertension and diabetes mellitus as the major components of MS. MS is a major threat for CVD incidence whereas the risk of evolving heart disease in the period of 5 – 10 years is twice in comparison to the persons without MS. Therefore, timely detection, deterrence, and management of the risk factors of the MS should is planned in order to reduce the CVD in the general population. Therefore, we will recommend that there should be public screening and public awareness program on national and regional levels to modify these factors and improve the mortality and morbidity of the community due to heart diseases.

Author's Contribution:

Concept & Design of Study:	Muhammad Umar Iqbal, Shehzad Ahmed, Irfan Mumtaz
Drafting:	RehanaKousar, Muhammad Umar Iqbal
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Final Approval of version:	Muhammad Umar Iqbal, Muhammad Sarwar Khalid

Conflict of Interest: The study has no conflict of interest to declare by any author.

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