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Research Article

**STUDY OF ST-ELEVATION MYOCARDIAL INFARCTION  
(STEMI) AND THE FREQUENCY OF ITS RISK FACTORS**<sup>1</sup>Dr. Maria Khalid, <sup>2</sup>Dr. Muhammad Shahbaz Hassan, <sup>3</sup>Dr. Romassa Javed<sup>1</sup>Nishtar Medical University, Multan<sup>2</sup>Bahawal Victoria Hospital, Bahawalpur<sup>3</sup>Islamabad Medical and Dental College, Islamabad**Abstract:**

**Objective:** The main purpose of this study was to find out the repetition rate of perilous reasons concerned with ST-Elevation Myocardial Infarction (STEMI) patients.

**Study Design:** Cross-sectional analysis study.

**Place and Duration:** The study was conducted in the Cardiology department of Mayo Hospital, Lahore from January, 2018 to August, 2018

**Materials and Methods:** A total number of 105 patients were selected for our study. Used non-probability convenient sampling technique for selection. Data about the presence or absence of risk factors was collected through interviewing all patients. Included the lifestyle, stress, obesity, hypertension and diabetes mellitus as the associated risk factors. The gathered data was analyzed by using SPSS 23.

**Results:** Gender distribution of masculine and feminine was as 60.2% and 39.8% accordingly. Percentage of non-STEMI and STEMI patients out of all selected patients (105) was as 20.9% and 79.1% respectively. Mean age of the patients was  $60.5 \pm 12.0$  years. STEMI and Non-STEMI mean  $\pm$  SD of age was  $61.55 \pm 11.513$  years and  $56.50 \pm 13.172$  years. Found statistically insignificant difference among mean age of STEMI and Non-STEMI with P value as equal to 0.079. Amongst the STEMI patients overweight, non-regular fruit eaters, patients with history of stress, sedentary lifestyle, patients of diabetes, hypertensive, smokers and with positive family history of STEMI were as 20.50%, 39.80%, 24.10%, 69.90%, 28.90%, 63.90%, 27.70% and 36.10% respectively. Non-STEMI patients were having low mean age than STEMI patients. Statistically significant factors were not found.

**Conclusions:** Sedentary lifestyle followed by family history of STEMI and hypertension was the most common risk factor of STEMI. Obesity was the least common risk factor. Any other factor was found to have no considerable association with ST-Elevation Myocardial Infarction (STEMI).

**Key Words:** NSTEMI (Non-ST Elevation Myocardial Infarction), STEMI (ST elevation myocardial infarction), risk factors, overweight, patients.

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## INTRODUCTION:

In developing countries, very common cause of illness and death is Acute myocardial infarction (AMI). STEMI is rising complication in developing countries and also an important health issue in well developed countries [1]. STEMI is among one of the groups of heart conditions recognized as ACS (acute coronary syndrome). ACS comprises of unstable Angina, STEMI and Non-ST segment elevation myocardial infarction (NSTEMI). Chest pain with ST elevation more than 0.1 mm in equal to or more than 2 contiguous leads or new onset of left bundle branch block with positive biomarkers is known as STEMI [3]

Standards for diagnosis of STEMI are cardiac enzymes, troponins (most special) and 12-lead ElectroCardioGram (ECG) [4]. Various patients with STEMI will experience extraordinary sickness and more than half of them will pass away within 24 hours, after the onset of ischemia [5]. STEMI is caused due to comprehensive and tenacious blocking of coronary artery by blood clot (thrombus). Myocardial impairment starts when the stoppage of coronary blood supply happens. The pumping ability of heart is determined by the level of impairment [6].

Pain to the neck, lower jaw or left arm and prior history of coronary artery disease are the factors through which STEMI diagnosis can be carried out. Whereas, palpitations or syncope, fatigue, vomiting, shortness of breath and nausea are some uncommon symptoms, seen in few patients [7]. 40.5% of the patients of ACS were having STEMI as per findings of a study carried out in emergency rooms of 17 cardiac care units (CCUS) from all provinces of Pakistan [8]. Rural areas of Pakistan are the major sponsors in the problem of heart diseases because maximum of the people of Pakistan lives in rural areas [9].

The peril reasons which influences to AMI as well as STEMI are distributed into non-modifiable and modifiable. Obesity, physical inactivity, smoking, high blood cholesterol, diabetes and hypertension are some risk factors which are included in modifiable category. Family history of heart disease, age and sex are non-modifiable risk factors. Risk factors for acute myocardial infarction (AMI) and ischemic heart disease (IHD) are rapidly increasing in Pakistan [10].

Ventricular aneurysm, pericarditis, left bundle branch block, left ventricular hypertrophy, normal male-pattern ST-changes and early repolarization pattern are some common reasons of ST-segment elevation, whereas, coronary spasm, myocardial bridge, aortic

dissection, brugada syndrome, stress induced cardiomyopathy and acute myocarditis are some rare reasons of ST elevation [11]. Compared to west countries prevalence of coronary spasm is higher in far eastern countries [12].

36 million deaths occurred due to non-communicable diseases (NCD) out of 57 million death in 2008 from whole world [13]. NCD is the cause of approximately 43% of the world's burden of disease and 60% deaths of the world. The main cause of deaths due to NCD, globally in 2008, is the cardiovascular diseases [14]. During the last several decades, the ratio of CVD related deaths reduced in developed countries but in poor and developing countries 80% rate is calculated [15]. The top most reason of death in adults of any country is ischemic heart disease [16]. Family history of cardiovascular disease, male sex and smoking are conventional risk factors for STEMI [17]. In patients of diabetes relative risk of myocardial infarction is increased from 2-fold to 3-fold [18]. Blood pressure more than 110/75 mmHg exclusively increases the risk of cardiovascular disease. HDL reduces and increase in LDL-C augments coronary events [19].

The outcomes and clinical events of STEMI are prophesied by time-to-reperfusion. For the reason that ST elevation also occurs without STEMI, situations with ST elevation and chest pain should not be instantly supported reperfusion [20]. The most significant complication related with STEMI is myocardial dysfunction. The common complications associated with STEMI are left ventricular thrombus, left ventricular aneurysm and left ventricular dysfunction particularly left ventricular systolic dysfunction [21].

restoration of blood supply to heart is the important treatment in STEMI which includes rarely coronary artery bypass grafts, Primary Percutaneous Coronary Intervention (PCI) and thrombolysis [22]. Glycoprotein antagonists and bivalirudin can be used, with less bleeding, for reduction of Pre-procedural coronary complications. Although, beta blockers are contraindicated in patients at risk of cardiac shock, beta blockers, statins and angiotensin-converting-enzyme inhibitors can be designated in patients with STEMI [24].

## MATERIAL AND METHODS:

A total number of 105 patients of myocardial infarction were selected in our cross-sectional research study. Sampling was carried out by using non-probability convenience sampling technique. Selection of the patients was carried out on the bases

of preformed selection criteria for the study. Keeping in view of various variables of the study designed an interview-based questionnaire fully evaluated before finalizing. after taking informed consent from all the patients, data and information was recorded on a predesigned proforma. All the subjects were taken in confidence about the confidentiality of their information and objective of the study was also briefed to them.

IBM SPSS V.23 was used for calculation and analysis of collected information and data. Percentage and frequency were used to describe different categorical variables like smoking status, education and socioeconomic status. Used Mean  $\pm$  SD to describe continuous variables like duration of hypertension, age and income. Chi-Square test pattern was used to determine the relation among

various categorical variables. means of quantitative variables were compared by using T test. Considered statistically significant P-value as  $\leq 0.05$ .

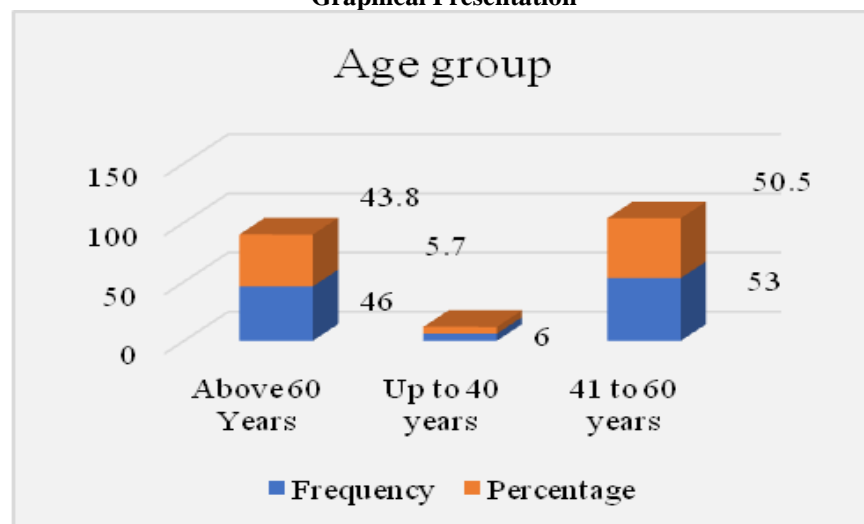
### RESULTS:

A total number of 105 patients were interviewed in out study. Maximum age of patients was 95 years and minimum age was 30 years with mean age of  $60.50 \pm 11.992$  years. NSTEMI and STEMI Mean  $\pm$  SD age was recorded as  $56.50 \pm 13.172$  years and  $61.55 \pm 11.513$  years. But with P-value 0.079, difference amongst mean age of STEMI and NSTEMI patients was not statistically significant. Occurrence of MI was higher with 50.5% (53) patients who aged among 41 years to 60 years and it was low with 5.70% (06) patients who were below 41 years of age.

**Table No 01: Different Age Groups.**

Age group	Frequency	Percent
Above 60 Years	46	43.8
Up to 40 years	6	5.7
41 to 60 years	53	50.5
<b>Total</b>	<b>105</b>	<b>100</b>

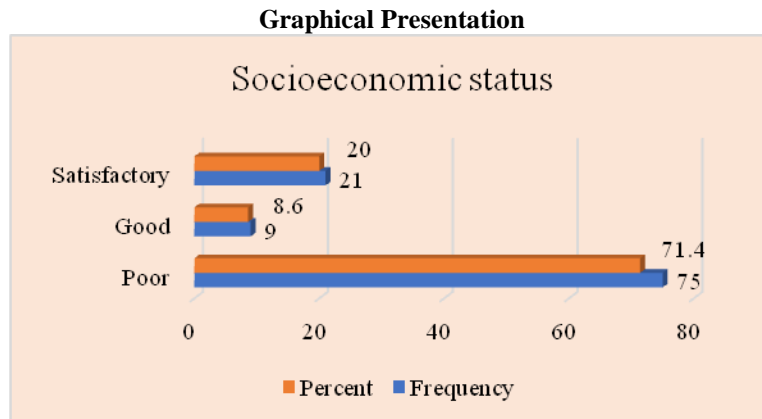
### Graphical Presentation



All patients were having different monthly incomes, we collected data from them. Maximum income was 2 lack rupees and minimum income was 5 thousand rupees,with interquartile range of 15 thousand rupees, average income was calculated as 20 thousand rupees. In our study patients with poor socioeconomic status,satisfactory socioeconomic status andgood socioeconomic status were as 75 (71.4%), 21 (20.0%) and 9 (8.6%) respectively. Monthly income of the patients as 30 thousand, in-between 30-60 thousand and more than 60 thousand were considered as poor, satisfactory and good socioeconomic status respectively.

**Table2: With Monthly income Socioeconomic Status of Patients.**

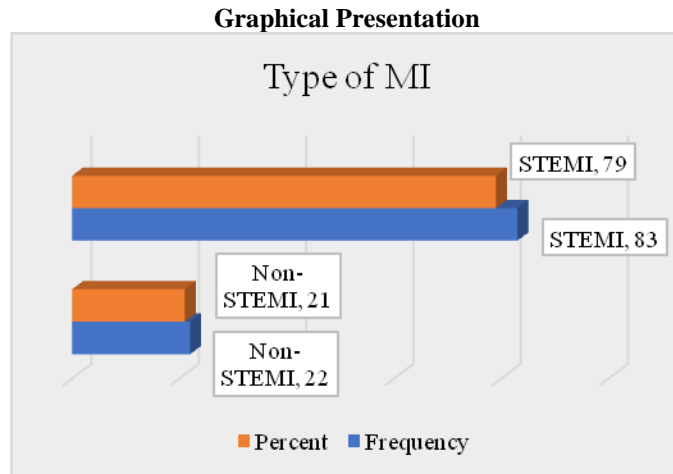
Socioeconomic status	Frequency	Percent
Poor	75	71.4
Good	9	8.60
Satisfactory	21	20.0
Total	105	100



STEMI and NSTEMI patients amongst total number of 105 patients were 83 (79%) and 22 (21%) respectively as shown in the table below.

**Table No 03: Type of Myocardial Infarction.**

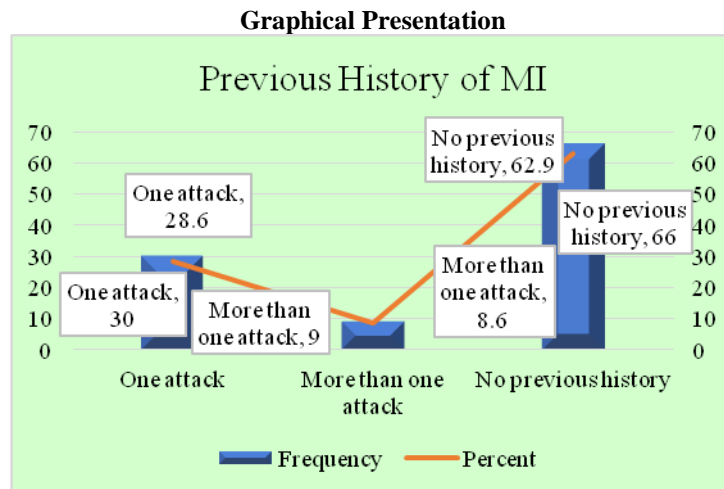
Type of MI	Non-STEMI	STEMI	Total
Frequency	22	83	105
Percent	21.0	79.0	100



Any sign of MI was not found in 66 (62.90%) patients whereas, single attack of MI was exhibited by 30 (28.60%) patients and > 01 MI attacks sustained by 09 (8.60%) patients. Tabular form is shown below in the table number 04.

**Table No 04: Previous history of Myocardial Infarction.**

Previous History of MI	Frequency	Percent
One attack	30	28.6
More than one attack	09	8.60
No previous history	66	62.9
Total	105	100



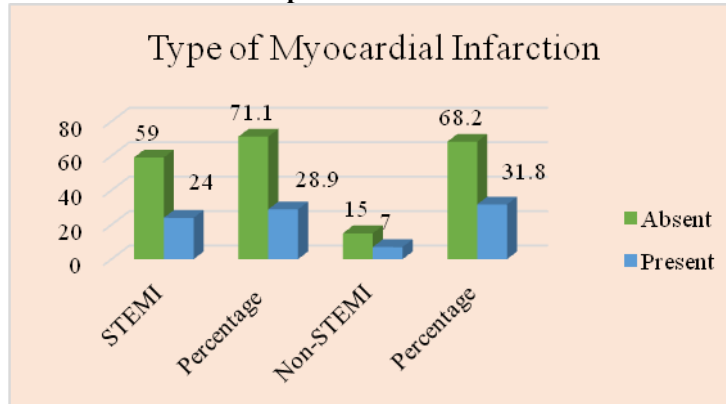
According to the duration wise findings of diabetes in our study among 105 patients, minimum duration was one year and maximum duration was 39 years with the mean duration of 10.06±9.616 years. With inter-quartile range of 13 years average duration was 06 years. Mean ± SD duration for STEMI and NSTEMI was 7.54±7.425 years and 18.71±11.757 years respectively. With P-value equal to 0.005, difference among STEMI and NSTEMI was significant. Amongst total of 83 STEMI patients there were 24(28.90%) diabetic patients and 59(71.1%) non-diabetic patients with a P-value of 0.797 which means that diabetes isn't a risk factor of MI. Table below describes the

collected data.

**Table No 05: Association of Diabetes with STEMI.**

Diabetes	Type of Myocardial Infarction				Total
	STEMI	Percentage	Non-STEMI	Percentage	
Absent	59	71.1	15	68.2	74(70.5%)
Present	24	28.9	7	31.8	31(29.5%)
Total	83	100	22	100	105(100%)

**Graphical Presentation**

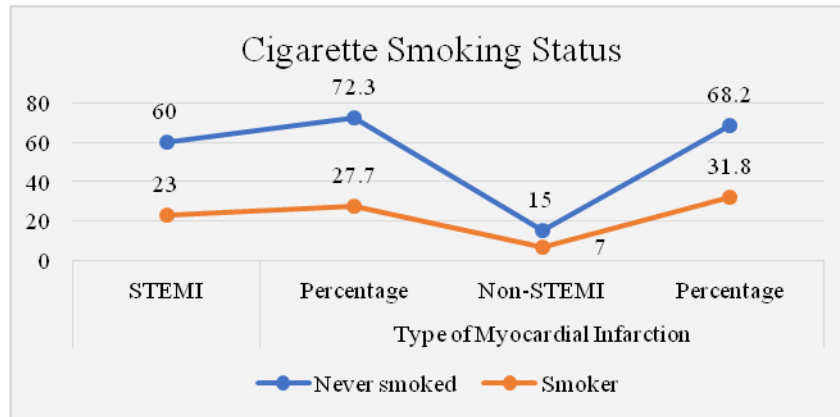


Amongst total of 83 STEMI patients there were 60(72.3%) who never smoked and from 22 patients of NSTEMI there were 15(68.2%) who never put themselves in the habit of smoking. Recorded P-value was 0.792, therefore, found no association. Results are described below in the table.

**Table No 06: Association of Cigarette smoking status with STEMI.**

Cigarette smoking status	Type of Myocardial Infarction				Total
	STEMI	Percentage	Non-STEMI	Percentage	
Never smoked	60	72.3	15	68.2	75(71.4%)
Smoker	23	27.7	07	31.8	30(28.6%)
Total	83	100	22	100	105(100%)

**Graphical Presentation**

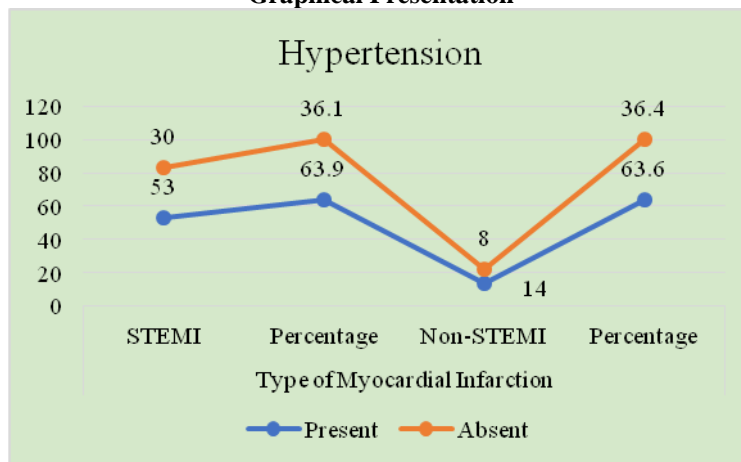


Amongst total of 83 STEMI patients, 53(63.9%) were hypertensive patients and 30(36.1%) were non-hypertensives. P-value assessed was 1.000 which is statistically insignificant. Association with hyper tension is shown below in the table.

**Table No 07: Association of Hypertension with STEMI.**

Hypertension	Type of Myocardial Infarction				Total
	STEMI	Percentage	Non-STEMI	Percentage	
Present	53	63.9	14	63.6	67 (63.8%)
Absent	30	36.1	08	36.4	38 (36.2%)
<b>Total</b>	<b>83</b>	<b>100</b>	<b>22</b>	<b>100</b>	<b>105 (100%)</b>

**Graphical Presentation**



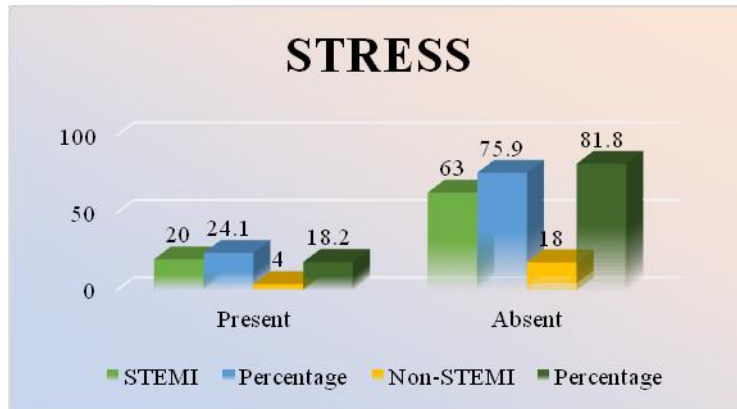
Amongst total of 83 STEMI patients, stress was present in 20(24.1%) and remaining 63(75.9%) had no stress. P-value was 0.776, which means that there is no part of stress in the causality of STEMI attack.

**Table No 08: Association of stress with STEMI.**

Stress	Type of Myocardial Infarction				Total
	STEMI	Percentage	Non-STEMI	Percentage	
Present	20	24.1	04	18.2	24(22.9%)
Absent	63	75.9	18	81.8	81(77.1%)
<b>Total</b>	<b>83</b>	<b>100</b>	<b>22</b>	<b>100</b>	<b>105(100%)</b>

**Graphical Presentation**

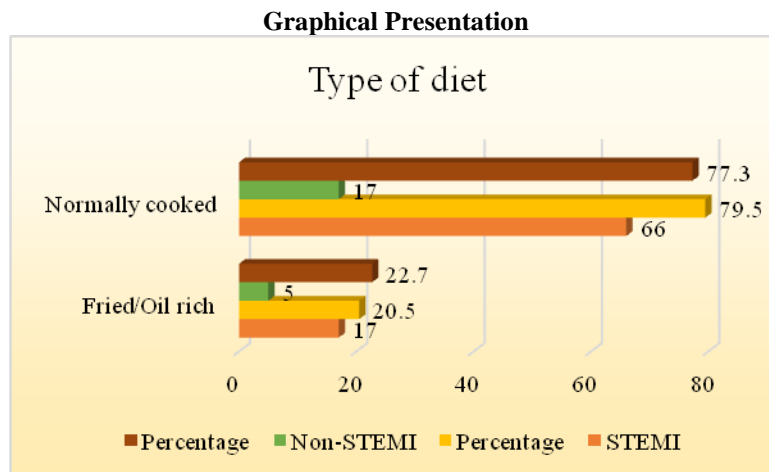




Amongst total of 83 STEMI patients, 17(20.5%)patients used oil rich diet whereas, 66(79.5%) used normally cooked food. Because P-value is 0.776 hence type of diet is not a risk factor.

**Table No 09: Association of Diet with STEMI.**

Type of diet	Type of Myocardial Infarction				Total
	STEMI	Percentage	Non-STEMI	Percentage	
Fried/Oil rich	17	20.5	5	22.7	22 (21.0%)
Normally cooked	66	79.5	17	77.3	83 (79.0%)
<b>Total</b>	83	100	22	100	105 (100%)



**DISCUSSION:**

Our study was cross-sectional analysis study which was conducted in the Cardiology unit of Holy Family Hospital, Rawalpindi, from January, 2018 to August, 2018. Out of 15.9 million cases of MI 3 million people in the year 2015 was reported with STEMI, hence, it is becoming a very serious health problem not only in developing countries but also in developed countries. 5 million cases per year were estimated in US.

61.55±11.513 years was the mean age calculated in our study and it is similar to a study conducted by Kirchberger et al, with P-value as < 0.001 statistically

significant [11], whereas, in our study P-value was equal to 0.079 statistically insignificant. The main reason of this difference was the sample size which was smaller in our study while in that study it was quite large in size.

In the occurrence of STEMI, family history is a non-modifiable risk factor. In patients of Non-STEMI than STEMI, occurrence of the positive family history was higher. Whereas, 24.3% patients had positive family history from the study conducted in Karachi and 25.6% patients had positive family history from European registry [15]. A difference was observed in-between these 2 studies and our study which might be due to the smaller size of our study.



According to the findings of our study, with P-value equal to 0.465, no association was observed among STEMI and family history which is similar to a study conducted in Karachi where P-value was 0.620 [13].

In comparison of STEMI and Non-STEMI patients with hypertension, found a higher frequency rate of hypertension in STEMI patients of present study. These results are almost similar to a study of kirchberger et al [12]. With P-value equal to 1.000, results of our study were found statistically insignificant whereas, with P-value less than 0.001 results of kirchberger et al study were statistically significant [12]. Reason behind the difference might be the larger size of kirchberger et al study samples.

Our results on incidence of diabetes associate with the conclusions of the study held out by Xavier et al [22]. Occurrence of diabetes was greater in Non-STEMI as match up to STEMI. These results nearly match with the results of the study complete in Peshawar [1]. The results from the study performed in Karachi were significant, whereas, our results were insignificant [15]. The reason behind the difference was might be the dissimilarity in the selection technique and smaller size of patients in our study.

Compared to STEMI patients, rate of recurrence of smoking was higher in Non-STEMI patients. Never smoked, current smokers and ex-smokers were 30.8%, 42.3% and 26.9% respectively according to a study conducted by kirchberger et al [13]. There was a great difference among our study and aforementioned study which might be due to the differences in size, gender sampling frequency, different communities and different settings. Study by Kirchberger et al showed association of smoking with STEMI with P-value as less than 0.001 [7] whereas, in our study association of smoking with STEMI was not found as the P-value was equal to 0.792.

### CONCLUSION:

Although, the difference of their means was insignificant, mean age of the STEMI patients was greater than that of Non-STEMI patients. Occurrence rate of STEMI was higher than that of Non-STEMI. Frequency of dissimilar risk factors of STEMI was noted. Although, the results were not statistically significant, frequency of diabetes, smoking and obesity was higher in Non-STEMI patients whereas, frequency of stress and hypertension was greater in STEMI patients. Sedentary lifestyle was most common pursued by hypertension and family history amongst STEMI patients. The obesity was

least frequent risk factor.

The results of our study can help hospital management to allow better planning about the STEMI patients. The results can also help the hospital management to provide knowledge and consciousness between the patients about the risk factors and the hospital management can assign proper funds for the STEMI patients.

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