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MYOCARDIAL INFARCTION;

RISK FACTOR ASSOCIATED WITH ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION IN CARDIAC EMERGENCY OF ALLAMA IQBAL MEMORIAL TEACHING HOSPITAL. PREVALENCE AND COMPARISON.

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ABSTRACT… Objectives: The study was carried out to asserting the prevalence and comparative analysis of risk factor that are known to be associated with ST-segment elevation MI on the basis of gender in Emergency unit of cardiology department of Allama Iqbal Memorial Teaching Hospital, Sialkot. **Study Design:** Retrospective, observational study. **Place and duration of Study:** Department of Cardiology; Allama Iqbal Memorial Teaching Hospital, Sialkot. From 1st March 2017 till 28 Feb 2018. **Patients and Methods:** All patients presented in cardic emergency during specified time period at Allama Iqbal Memorial Teaching Hospital with new onset of ST segment elevation MI, having established risk factors (DM, Smoking, Family History of IHD, Obesity, Dyslipidemia) having completed follow up of 2 months were included in study. Patients were assigned in two group according to their respective gender for finding out prevalence of risk factors among them. Group-I included males while Group-II included females. Patients who didn't completed followup, not willing to participate in study, who leave against medical advice, had CCF, CRF, CLD, LBBB, Coagulation abnormalities, stroke, any condition mimicking ST segment elevation other than STEMI were excluded from study. The data collected for variables was analyzed using SPSS v 22. **Results:** Three hundred and fifty (350) patients presented in cardic emergency were subjected to the study. Out of 350, 20 patients didn't complete the follow-up of 2 months. Ten patients didn't give consent to be included in the study while 15 patients were excluded in accordance with the exclusion criteria and 5 patients were left against medical advice. Out of 300 patients studied 233 of patients (77.7%) were males and 67(22.3%) of patients were female, with male to female ratio of 3.5:1.0. Among age group variation patients in range of 41-50 years constitute 40.3% (121 patients) of cases. Smoking as a risk factor constitute 70.4% (164 pt.) and Diabetes mellitus 62.3% (43pt.) among males and females respectively. Anterior wall MI reports to be 62.20% (145 pt.) and 82.10% (55 pt.) among males and females followed by other types of STEMI. **Conclusion:** Smoking is identified as an independent risk factor that can lead to STEMI in young males while Diabetes Mellitus and hypertension identified as a risk factor for progression to STEMI in females. Among non-modifiable factors male sex, old adults and family history identified as factors that can lead to STEMI.

Key words: ST elevation myocardial infarction (STEMI), Anterior Wall Myocardial Infarction (AWMI), lateral wall Myocardial Infarction (LWMI), Inferior Wall Myocardial Infarction (IWMI), Left Bundle Branch Block (LBBB), Diabetes Mellitus (DM), Ischemic Heart Disease (IHD), Congestive Cardic Failure (CCF), Chronic Renal Failure (CRF), Chronic Liver Disease (CLD).

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INTRODUCTION

Coronary heart diseases is a major disease causing significant mortality and long term complications in patients.[1] It is a term that indicate a spectrum of diseases ranging from angina uptill ST-segment elevation myocardial infarction.[2] The interaction among the atherosclerotic plaque, platelet activation, thrombus formation and coronary vasospasm can lead to acute myocardial infarction. Total occlusion of a coronary artery or a transmural infarct can lead to necrosis of the myocardial cells resulting in STEMI. Our study was focused to carry out the prevalence and analysis of significant risk factors associated

with a fraction a coronary artery disease that is ST-segment elevation MI (STEMI). Almost 20% of all coronary heart disease is STEMI and it is also associated with increased in-hospital mortality.[3] The annual incidence of STEMI in American population Is 38.0%.[4] it is estimated that approximately 17.1 million death per year are attributed to coronary heart disease.[5] While the risk of MI in South-Asian population is 50 times higher than white peoples residing in UK.[6] Although STEMI generally presents in patients with age group of >45 years but its frequency in younger people at the same time may increases pre-mature death and causes a long term disability.[7,8] Risk factors such as smoking, diabetes mellitus, hyperlipidemia, obesity, age and family history are known to cause a significant impact on the different body functions as well as has a pivotal role in the series of events that can lead to STEMI. Some of above mentioned factors are modifiable while some are not. It is estimated that number of new fatal and non-fatal coronary events and subsequent mortality can be reduced by modifying the modifiable factors.

Diabetic patient has a 2-4 times more increased risk in developing MI as compared to non-diabetic population.[9] The possible mechanisms that influence the increased risk in diabetes for cardiovascular events include, insulin resistance, changes in endothelial function, dyslipidemia, chronic inflammation and release of mediators of inflammation, procoagulability and impaired fibrinolysis.[10] Hypertension on the other hand causes increased risk of developing atherosclerosis in patients that can ultimately lead to development of acute STEMI, in addition to development of atherosclerosis there is also an increase in sympathetic tone which through complex mechanism lead to STEMI.[11] Tobacco smoking is a major determinant for presenting with STEMI as compared with non-STEMI.

Obesity and sedentary lifestyle increases the insulin resistance and also causes increase in accumulation of fat in body cells respectively that can in turn progress to plaque formation and causes narrowing of the vasculature posing a threat for STEMI along with other associated complication. Family history of ischemic heart disease is a significant independent marker for causing STEMI as elicited by many studies.[12] Although primary prevention is likely to be the best strategy in reducing the mortality and long term disability in patients, the data about risk predictor in our population is still limited. As no study has been done to asserting risk factors in our setup so we have decided to conduct this study.

PATIENTS AND METHODS

All patients presented in cardic emergency during specified time period at Allama Iqbal Memorial Teaching Hospital with new onset of ST segment elevation MI after fulfilling the criteria of STEMI

(i) Symptoms of ischemia,
(ii) Electrocardiographic changes indicative of ischemia >0.1mV elevation in two contagious limb leads and/or >0.2mV elevation in pre-cordial leads
(iii) 6-12 hours after symptoms biochemical markers level corresponding to MI range (CK-MB, TROPONIN)) having established risk factors (e.g. Diabetes mellitus, smoking, dyslipidemia, obesity, family history of Ischemic Heart disease) and having completed follow up of 2 months were included in study.

Patients were assigned in two group according to their respective gender for finding out prevalence of risk factors among them. Group-I included males while Group-II included females. Patients having history of Ischemic heart disease, previous/Known case of chronic kidney disease, chronic liver disease, congestive cardic failure, having other conditions that mimic ST-segment elevation, with coagulation abnormalities, having previous Left bundle branch block or any other previous conductional defect, having previous cerbovascular accidents, patients not willing to participate in study, patients who left against medical advice and patients who refused follow up of 2 months were excluded from study.

Patients were first subjected to undergo electrocardiography (ECG) and was then on the basis of ECG finding were given either standard protocol of Acute Coronary Syndrome including

Aspirin 300mg, Clopidogrel 300mg, Inj. Heparin 1000 units(1 ml) i/v stat or was thromobolysed with streptokinase 50,000 IU after giving standard injectable doses of solocortif, phenarimine maleate, ranitidine, Metoclopramide and morphine(If ECG was suggestive of ST segment elevation MI), Patients who presented at or after 6 hours of onset of symptoms suggestive of MI was firstly undergone ECG, then Troponin-I test for confirmation of myocardial infarction and managed accordingly. Streptokinase injection were not given to patients who presented >12 hr from onset of symptoms. Patients then subsequently shifted to ward for further management and assessment. The data collected for variables was analyzed using SPSS v 22.

Inclusion Criteria for Risk Factors

Hypertension was defined as a systolic blood pressure ≥ 140 mmHg and/or a diastolic pressure ≥ 90 mmHg: a history of anti-hypertension medications was also taken into account. Type II diabetes was noted in patients who met the 1999 WHO diagnosis criteria. Smoking was defined as smoking for 1 year or longer, and a smoking index was calculated as the number of daily cigarettes × years of smoking. A family history of early CAD was recorded in patients where it was among the first degree relatives. Obesity was defined according to the criteria set by WHO e.g BMI of 30 or more.

RESULTS

Three hundred and fifty (350) patients presented in cardiac emergency were subjected to the study. Out of 350, 20 patients didn't complete the follow-up of 2 months. Ten patients didn't give consent to be included in the study while 15 patients were excluded in accordance with the exclusion criteria and 5 patients were left against medical advice. Out of 300 patients studied 233 of patients (77.7%) were males and 67(22.3%) of patients were female, with male to female ratio of 3.5:1.0. Table-I shows the respective age group differences among patients with STEMI.

Sr. No.	Age group	Frequency	Percentage
1	31-40 years	56	18.7%
2	41-50 years	121	40.3%
3	51-60 years	51	17.0%
4	61-70 years	54	18.0%
5	71-80 years	18	6.0%

Table-I. Age group variation in presentation of STEMI.

Among occupation 114 patients (38.0%) presented were labourers, 67patients (22.3%) were female with no specific occupation (housewives) followed by farmers with 57 patients (19.0%). Among modifiable factors smoking with 44 patients (77.2%.) were found mostly among farmers followed by businessmen with 19(76.0%) and labourers with 82 pt(71.9%), diabetes mellitus most prevalent among female who were housewives with 43(64.2%) of patients. Hypertension was prevalent among govt. employee with 19pt (76.0%). Obesity was found largely among housewives with 36pt (53.7%). Table-II shows the relative prevalence of risk factors among males and females.

Figure-1 shows the relative prevalence of risk factors in specific age groups among males and females.

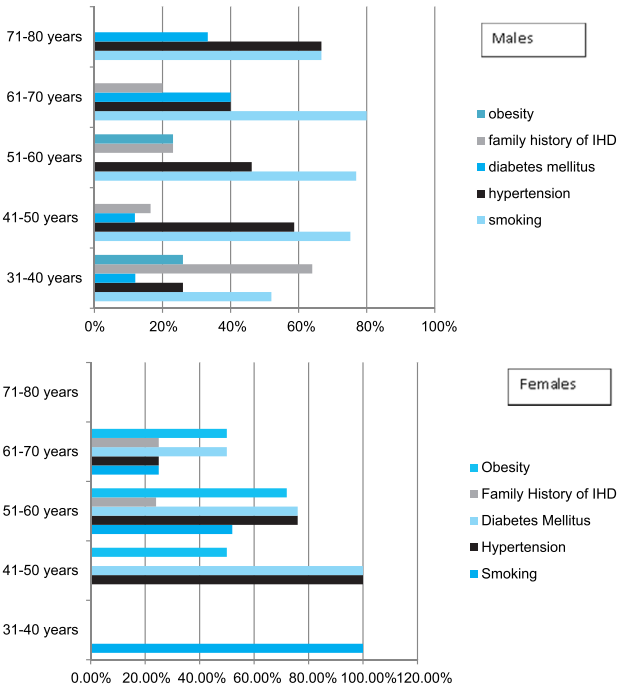

Figure-1. Risk factor variation among different age group

Table-III shows the relative time from developing of typical and nontypical presentation of STEMI and the time of arrival in Cardiac emergency.

Among the patients presented in emergency department streptokinase injection were given to patients who presented within 12 hr of developing of symptoms. 207 (69.0%) of patients were instituted with streptokinase injection after consent while 68 pt(22.7%) were late for streptokinase being presented after 12 hr from onset of symptoms streptokinase was contraindicated in 6 patients. Autolysis was already done in 10 patients.9 patients didn't give consent for streptokinase injection. Figure 4 shows the relative incidence of ECG changes defining types of STEMI in study group.

Sr. No.	Risk factor	Group-I		Group – II		Overall Prevalence
		Males (n=233)	Percentage	Females (n=67)	Percentage	
1.	Smoking	164	70.4%	25	37.3%	63.00%
2.	Diabetes Mellitus	37	15.9%	43	64.2%	26.70%
3.	Hypertension	113	48.5%	37	55.2%	50.00%
4.	Obesity	19	8.2%	36	53.7%	18.30%
5.	Family History of IHD	62	26.6%	12	17.9%	24.70%

Table-II. Prevalence of risk factors- gender distribution.

Sr. No	Time Till Presentation	Group I		Group II		Total
		Males	Percentage	Females	Percentage	
	31-60min	38	16.3%	6	9.0%	44
	1-1.5hr	14	6.0%	0	0.0%	14
	1.5-2hr	24	10.3%	0	0.0%	24
	2-3hr	42	18.0%	12	17.9%	54
	3-6hr	33	14.2%	6	9.0%	39
	6-9hr	32	13.7%	13	19.4%	45
	9-12hr	0	0.0%	12	17.9%	12
	>12hr	50	21.5%	18	26.9%	68

Table-III

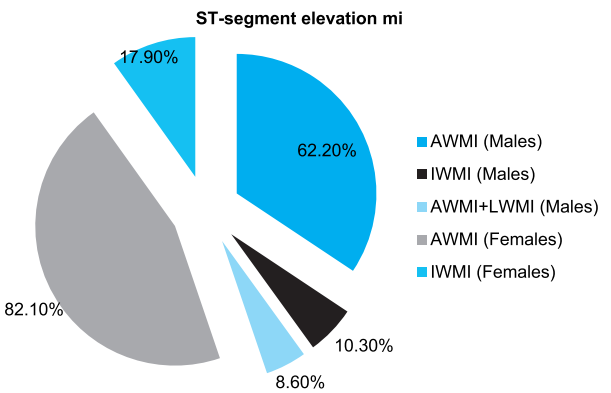

Figure-2. Types of STEMI

In the follow-up of patients that had been done for 2 month thereafter the attack of STEMI. elevation among 149(49.7%) of patients were resolved completely while others show changes of STEMI. Pre discharge echo revealed that the 125 patients (41.7%) who are affected from STEMI had reduced ejection fraction of <50%. while 56 patients (18.7%) suffered from mitral regurgitation.

DISCUSSION

Coronary heart disease is a major contributor in mortality among patients with co-morbidities/ risk factors worldwide. It is thus important to determine risk factors and subsequent percentage wise distribution so that mortality rates and long term complication could be tackled properly. In our study male to female ratio is 3.5 to one while the study conducted by A U Saleh et al[13] showed the relative presentation gender wise male to female ratio was 4:1 (81%:19%) in Pakistan. The abovementioned study results are in accordance with our data.

Our study illustrated that the age group ranging

from 41-50years(40.3%) are most frequently affected from STEMI followed by younger age group ranging from 31-40 years with preponderance of 18.7% while the study by Siwach SB et al[14] concluded that 19.2% of the patients were 40 years or below in age.

Smoking incidence found to be 63.0% overall as also in the study by Rajeev Bhardwaj et al[15] showing the incidence of smoking at 58.8%. Smoking independently shown to be a major risk factors among other modifiable factors causing STEMI. Among younger age group it's incidence is 57.10%, increasing susceptibility to STEMI as also authenticated by Amelia Lloyd et al[16] indicating that there is eight fold increase in risk for STEMI among young adults. Smoking was found to be 52% of patients in young age group <40 years in males while among females it is an independent modifiable cause in same age group leading to STEMI.

Hypertension was found to be in 50% of study population indicating its major role in the progression of mechanism that leads to STEMI as also showed by KAMIR study conducted by Min Goo Lee et al[17] indicating that 48.0% patients with STEMI are hypertensive. While Claudio Picariello et al[18] concluded that hypertensive patients with STEMI are more likely to be older, female, of non-white ethnicity That is in line with our study which depicts hypertension a major cause of STEMI in older female, age group ranging from 41-60 years.

Our study shows that 26.70% of diabetic patient suffered from acute STEMI overall, among females 64.2% had diabetes while the study conducted by Petreson PN et al[19] shows 27% of patients with STEMI were diabetic. Among females who were diabetic there was a greater propensity to be obese with BMI greater than 30.

Obesity noted to be 18.20% in our study group while the study conducted by Sandeep R. Das et al[20] showed the relative prevalence of obesity is 36.2% among patients presented as STEMI. Difference is statically significant owing to the dietary habits of patients in this region. As fast food is known to increase the fat content of body there is no such propensity for fast food (burgers, pizzas etc.) in our local population.

Among non-modifiable factors, 24.70% of patients had a positive family history of ischemic heart disease in first degree relative, most of the subjects were young males >40 years. This designate family history as an independent factor linked in the progression to STEMI as also concluded by Bertuzzi M et al[21] in his study.

Among the type of STEMI, anterior wall MI was most commonly encountered irrespective of any gender difference with 62.20% in males while 82.10% in females as in congruence with Tipoo et al[22], who reports that the incidence of anterior wall MI among STEMI patients were 56.6% while Culic et al[23] reported incidence of AWMI TO BE 47.7%.

Time from onset of symptoms till presentation to emergency department was >12hr in 22.7% (68pt) while study conducted by Maqbool H. Jafary et al[24] showed meantime till presentation was 13.2±6.2 hours. Implying that there is a need to educate the people about the risk factors and relevant sign and symptoms of myocardial infarction and to educate when to approach the nearest healthcare facility. Although females presented earlier in emergency setup as compared to males.

Pre discharge echocardiography was done in patients who diagnosed as a case of STEMI, it was evaluated that among the study population 41.7%(125) of patients had reduced ejection fraction of <50 after STEMI Patrizio Pascale et al[25] in their study showed reduced ejection fraction of 35% in 62% of patients and concluded that 1 year mortality rate was 6.7% after MI pointing to the need for instituting angiotensin converting enzyme inhibitor and beta blocker to reduce the remodeling of heart and in turn decreasing the 1 year mortality rate. Among regurgitant lesion 18.7% (56pt) had mitral regurgitation on pre discharge echocardiography as also showed by Bursi F et al.[26] concluding that incidence of Mitral Regurgitation varies from 11 to 59%.

Afsoon Fazlinezhad et al[27] In his study concluded that 45% of patients initially diagnosed as a case of myocardial infarction developed mitral regurgitation.

CONCLUSION

Smoking is identified as an independent risk factor that can lead to STEMI in young males while Diabetes Mellitus and hypertension identified as a risk factor for progression to STEMI in females. Among non-modifiable factors male sex, old adults and family history identified as factors that can lead to STEMI. Post-STEMI there is a need to institute Angiotensin converting enzyme inhibitor and beta blocker to reduce the remodeling and in turn 1 year mortality rate.

DISCLAIMER

We declare the abstract and article has not been previously presented or published in a conference, or other relevant information.

LIMITATIONS

- Patients who were included in last leg of study are still in follow up whom result may can change study results.
- Longer follow up is required to assess further complications.
- As study is done/ centered in only one institute which draws population of a selected area so results may vary.

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