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ORIGINAL ARTICLE

Association between TIMI Risk Score and in-Hospital Mortality in Acute STEMI Patients Undergoing Primary PCI

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ABSTRACT

Aim: To determine the association between TIMI risk score and in-hospital mortality and adverse events in acute STEMI patients undergoing primary PCI at a tertiary cardiac care facility.
Study design: Retrospective study.
Place and duration of study: Catheterization Laboratory of Cardiology Unit, Dr. Ruth KM Pfau, Civil Hospital Karachi from 1st October 2017 to 31st March 2019.
Methods: Three hundred and sixty six acute STEMI patients who admitted through emergency and underwent primary angioplasty were enrolled. A proforma was filled out for the said subjects that encompasses continuous and categorical variables including age, gender, family history of coronary artery disease, smoking history, diabetes, hypertension, dyslipidemia, systolic and diastolic blood pressure, heart rate, onset symptoms to emergency room (whether >4 hours or ≤4 h), location of myocardial infarction [anterior, inferior, lateral or posterior, and right ventricular infarction], drugs given prior to angioplasty[aspirin, clopidogrel, prasugrel, heparin, Glycoprotein IIb/IIIa receptor antagonists], success of angiography, culprit vessel, number of diseased vessels, and in-hospital outcomes..
Results: 270 (73.8%) were males and 96 (26.2%) were females with male to female ratio 2.8:1. Mean age was 56.25±11.45 years. Main risk factors were hypertension 230 (62.8%) cases, diabetes 198(54.1%) cases and smoking 167 (45.6%) cases. Onset of symptoms to the arrival to emergency room for treatment was ≤4 hours 201 (54.9%) cases and >4 hours in 165(45.1%) cases. In hospital mortality rate was 3.82%. Hospital in mortality 11(3%) cases was associated with hypertension and diabetes.
Conclusion: This study show that a significant number of patients were observed adverse outcomes associated with higher TIMI risk score for in hospital. Therefore, the prognostic TIMI risk score is a powerful tool for predicting hospitalized patients.
Key words: Acute myocardial infarction, Coronary artery disease, TIMI Risk Score, In-Hospital Mortality.

INTRODUCTION

ST elevation acute myocardial infarction, a coronary artery disease, has evolved as the most prevalent health hazard taking significant death toll across the world.[1] Therefore, immediate attempt to restore the coronary perfusion through novel means of percutaneous coronary intervention (PCI) is at the heart of its management.[2,3] There is a general consensus of speculators regarding the timely receipt of PCI which is set within 90 minutes and have been related to its surprising efficacy in the reperfusion of infarcted heart compared to fibrinolysis.[4,5] However, the mortality benefits vary depending upon the risk status of the patient as high-risk patients appeared to be benefited more than the low risk ones[6].

Therefore, in order to better optimize the therapeutics, it is of paramount importance to stratify the primary PCI patients before intervention. Promising evidences have been documented relating to application of risk scores in STEMI patients who are solely managed with primary PCI[7-9]. Morrow et al, in their logistic regression model, established that TIMI risk score serve as a convenient bedside tool for risk assessment of STEMI patient at arrival in hospital and clinically useful in foretelling the in-hospital outcome in terms of mortality[10] Luca et al[11] further supported the practical utility and cost-effectiveness of TIMI risk score in stratifying the patient's clinical status who underwent primary angioplasty for STEMI.

In this study, we seek to determine the association between TIMI risk score and in-hospital mortality and adverse events in acute STEMI patients undergoing primary PCI at Department of Cardiology of Dr. Ruth KM Pfau, Civil Hospital Karachi.

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MATERIALS AND METHODS

This study was conducted on the data collected in retrospect from files in Catheterization laboratory of Cardiology Unit of Dr. Ruth K.M. Pfau, CHK including acute STEMI patients who were admitted through emergency and underwent primary angioplasty, during the interval from October 2017 till March 2019. A total of 366 patient's age above 18 years who consecutively underwent Primary angioplasty after being diagnosed, in emergency, with acute STEMI were included in the study. Patients with known history of STEMI and already received thrombolytics were excluded from the study. A proforma was filled out for the said subjects that encompasses continuous and categorical variables including age, gender, family history of coronary artery disease, smoking history, diabetes, hypertension, dyslipidemia, systolic and diastolic blood pressure, heart rate, onset symptoms to emergency room (whether >4 hours or ≤4 h), location of myocardial infarction [anterior, inferior, lateral or posterior, and right ventricular infarction], drugs given prior to angioplasty [aspirin, clopidogrel, prasugrel, heparin, Glycoprotein IIb/IIIa receptor antagonists], success of angiography, culprit vessel, number of diseased vessels, and in-hospital outcomes including successful PCI, emergent CABG, death, major bleed, stroke and stent thrombosis.

The data was entered and analysed through SPSS-21.0. Chi-square test was applied in which the p-value of <0.05 was considered statistically significant.

RESULTS

There were 270(73.8%) males and 96 (26.2%) females with male to female ratio 2.8:1. The mean age was 56.25±11.45years. Main risk factors were hypertension 230(62.8%) cases, diabetes 198(54.1%) cases and smoking 167(45.6%) cases. Onset of symptoms to the arrival to emergency room for treatment was ≤4 hours 201(54.9%) cases and >4 hours in 165(45.1%) cases. According to Killip classification mostly were in class II 288 (62.3%)

cases followed by class III 132 (36.1%). Majority of patients were diagnosed single vessel diseased (SVD) 271(74%) cases and blocked the left anterior descending artery LAD in 257 (70.2%) cases (Table 1).

In hospital mortality rate was 3.82%. At TIMI score of 5 were observed 4(1.1%) cases, 5(1.5%) at the TIMI score of 10 and 5(1.5%) at the TIMI score of 11. Hospital in mortality 11(3%) cases was associated with hypertension and diabetes. Majority of mortality 9(2.5%) single vessel diseased was observed while 10(2.7%) cases left anterior descending artery LAD involved (Table 2).

Table 1: Risk profile and disease severity of acute STEMI patients undergoing primary PCI for STEMI (n=366)

Variable	No.	%
Age (years)		
20-35	4	1.1
36-50	130	35.5
51-65	158	43.2
66-75	51	13.9
>75	23	6.3
Gender		
Male	270	73.8
Female	96	26.2
Risk factors		
Diabetes	198	54.1
Hypertension	230	62.8
Current Smoker	167	45.6
Dyslipidemia	148	40.4
Onset of symptoms to the arrival to emergency room for treatment		
≤ 4 Hours	201	54.9
> 4 Hours	165	45.1
Previous history of infarct		
No	358	97.81
Yes	8	2.18
➢ STEMI	6	1.6
➢ NSTEMI	2	0.5
Killip class		
Class I	-	-
Class II	228	62.3
Class III	132	36.1
Class IV	6	1.6
Disease severity		
Number of vessels involved		
➢ Single vessel diseased	271	74.0
➢ Two vessels diseased	65	17.8
➢ Three vessels diseased	30	8.2
Infarct related artery		
➢ LAD	257	70.2
➢ RCA	89	24.3
➢ LCX	20	5.5

Table 2: Outcome of hospital admitted patients undergoing primary PCI for STEMI (n=366)

Variable	No.	In-hospital status		P value
		Successful PCI	Death	
Age (years)				
20-35	4	4(1.1%)	-	0.083
36-50	130	121(34.4%)	9(2.45%)	
51-65	158	153(43.5%)	5(1.4%)	
66-75	51	51(14.5%)	0	
>75	23	23(6.5%)	0	
Gender				
Male	270	261(71.3%)	9(2.5%)	0.411
Female	96	91(24.9%)	5(1.4%)	
Risk factors				
Diabetes	198	187(51.1%)	11(3%)	<0.061
Hypertension	230	219(59.8%	11(3%)	0.214
Current Smoker	167	166(45.4%)	1(0.3%)	0.003
Dyslipidemia	148	142(38.8%)	6(1.6%)	0.851
Onset of symptoms to the arrival to emergency room for treatment				
≤ 4 Hours	201	201(54.91%)	0	<0.001
> 4 Hours	165	151(41.25%)	14(3.82%)	
Killip class				
Class I	-	-	-	<0.001
Class II	228	228(62.3%)	-	
Class III	132	118(32.2%)	14(3.8%)	
Class IV	6	6(1.6%)	-	
Disease Severity				
• **Number of vessels involved**				
➢ Single vessel diseased (SVD)	271	262(71.6%)	9(2.5%)	0.014
➢ Two vessels diseased (2VD)	65	64(17.5%)	1(0.3%)	
➢ Three vessels diseased (3VD)	30	26(7.1%)	4(1.1%)	
• **Infarct related artery**				
➢ LAD	257	247(67.5%)	10(2.7%)	<0.001
➢ RCA	89	89(24.3%)	-	
➢ LCX	20	16(4.4%)	4(1.1%)	
Thrombolysis in myocardial infarction (TIMI) risk score				
0	8	8(2.2%)	-	<0.001
1	94	94(25.7%)	-	
2	110	110(30.1%)	-	
3	52	52(14.2%)	-	
4	49	49(13.4%)	-	
5	21	17(4.6%)	4(1.1%)	
6	9	9(2.5%)	-	
7	13	13(3.6%)	-	
10	5	-	5(1.5%)	
11	5	-	5(1.5%)	

DISCUSSION

Coronary artery disease remains the leading cause of death and has a significant social and economic impact[12]. Although CAD mortality rates are generally lower in developed countries, the rates have decreased only slightly for younger populations. IHD has been reported to be more common in the younger age group in recent years, but the risk certainly increases with age[13]. Mortality in elderly STEMI patients remains significantly higher than in younger patients[14]. In this study evaluated association between TIMI risk score and hospital mortality.

Some international studies still controversially reported the interaction of gender and the incidence of myocardial infarction[15]. In our study, male is a significant risk factor for myocardial infarction, especially at a young age. Some studies, even after adjusting for age and other risk factors suggest a specific gender cause[16,17], while others fail to establish an association between gender and mortality[18]. More than half of the Pakistani younger's are smoker who is associated with IHD.[20] In our study observed 45.6% smoking associated acute STEMI. One patient was expired due to high TIMI score. An international study conducted by Gao[21] reported almost same results[21].

We analyzed an overall in-hospital mortality rate of 3.8% (n=14). However some international studies reported hospital in mortality range 19% to 34%.[22-24] Some factors were significantly associated with in-hospital mortality such as risk factors, previous history of infarct, disease severity, Klipp class systolic and TIMI risk score >5. Diabetes and hypertension are firmly established as a risk factor for IHD. In our study observed history of hypertension in 230(62.8%) cases and diabetes in 198(54.1%) cases. Diabetes and hypertension were significantly correlated to in-hospital mortality in those patients TIMI score is more than 5. However the study of Talreja[25] also reported hospital in mortality 18.2% and 18.15 cases were hypertensive and Diabetes mellitus respectively.

However in our study found that higher TIMI score had increased the mortality rates. Therefore, the TIMI score can be used to identify patients in whom early therapeutic intervention may improve long-term survival outcomes and thereby improve patient care[26].

In addition, our findings may also be useful for physicians, where a validated risk tool provides a cost-effective way to screen patients. This is particularly useful in developing countries, where the majority of the population is covered by a government-funded health care system that is already limited.

CONCLUSION

A significant number of patients were observed adverse outcomes associated with higher TIMI risk score for in hospital. Therefore, the prognostic TIMI risk score is a powerful tool for predicting hospitalized patients.

Conflict of interest: Nil

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