



## CORRELATION OF TIMI RISK SCORE WITH GENSINI SCORE IN PATIENTS WITH NSTEMI

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### Author's Contribution

RB:Conducted the study and wrote the article. MS:Helped in review the article. HA:Re-arranged data and corrected article. MAI:Tables and figures. NAS and AD made corrections and did the proof reading.

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### ABSTRACT

**INTRODUCTION:**Multiple risk scores have been applied in patients who present in cardiac emergencies to risk stratify patients into different groups ranging from low to high risk categories. One common and easily useable risk score is Thrombolysis in Myocardial Infarction (TIMI) Score. The stratification can be used as a clinical tool. This study was performed to see the correlation of angiographic extent of coronary artery disease by assessing GENSINI score with different classes of TIMI risk score in patients presenting with non-ST-elevation myocardial infarction (NSTEMI).

**MATERIAL AND METHODS:** It was a cross-sectional observational survey conducted in Cardiology Department ,(PIC)Punjab Institute of Cardiology, Lahore over a duration of six months from 31st October 2013 to 30th March 2014. Using consecutive sampling, 131 patients with NSTEMI with age between 30 to 70 years of either sex were enrolled. Patients with past history of ischemic heart disease and STEMI were excluded. NSTEMI was labeled as new onset or worsening chest pain, without acute ST elevation MI or having left sided bundle branch block on ECG and elevated cardiac troponin-I  $\geq 0.2\text{ng/ml}$ ). Modified GENSINI score on angiography was used to measure the extent of coronary vessels involvement and correlation between angiographic severity of coronary artery disease with TIMI score was calculated.

**RESULTS:**131 patients were included with mean age of  $57.73 \pm 6.974$  ranging from 30 year to 70 years of age. Mean TIMI score was  $3.90 \pm 1.593$  and mean Gensini score was  $69.08 \pm 11.9$  patients. There were 96 (73.3%) males while remaining 35 (26.7%) were female patients. Correlation between angiographic severity of coronary artery disease with different classes of Thrombolysis in Myocardial Infarction (TIMI) risk score in patients presenting with non-ST- segment elevation myocardial infarction was linear and strongly positive ( $r=0.774$ ) and showed that TIMI risk score is valid in our population.

**CONCLUSION:** It is concluded that Thrombolysis in Myocardial Infarction (TIMI) risk score can be used as a valid tool for the stratification of patients after non ST-Segment elevation myocardial infarction and is directly correlated with Gensini score.

**KEYWORDS:** TIMI Score, Myocardial Infarction, NSTEMI, Angiography, Gensini Score

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## INTRODUCTION

In south Asia the frequency of developing coronary artery disease is on a rising trend.<sup>1</sup> In cardiac emergency the most common diagnosis is acute coronary syndrome which includes unstable angina (UA), non-ST elevated myocardial infarction (NSTEMI) and ST- elevated myocardial infarction (STEMI). Acute coronary syndrome is precipitated by significant disease in coronary arteries secondary to thrombus formation.<sup>2</sup>

To prevent the mortality due to cardiac events early diagnosis, risk stratification and reperfusion therapy is mandatory. Multiple risks scoring systems have been used to assess patients risk and to decide about further management. Out of these risk scores, TIMI (Thrombolysis in Myocardial Infarction risk scores) and GRACE (the Global Registry of Acute Cardiac Events) scores are commonly used clinically.<sup>3</sup>

In TIMI risk score, there are seven components which include age more than 65 years, more than 3 risk factors for coronary artery disease (CAD) documented CAD on catheterization, ST deviation more than 0.5mm, more than 2 episodes of angina in last 24 hours, and previous use of aspirin within last week and elevated cardiac biomarkers.<sup>4</sup> It is an easy tool to assess the risk of mortality and morbidity associated with coronary artery disease.<sup>5</sup>

Patients with elevated TIMI risk score are more prone to have severe CAD involving multiple arteries and patients with low or intermediate score have relatively less involvement of coronary arteries. Patients with score more than 4 must be subjected to early invasive coronary intervention.<sup>8</sup>

It has been noticed that with rising TIMI risk score category, there is an elevation of major adverse cardiac events and it is associated with more severer coronary artery disease.<sup>6,7</sup> In a study, 71% patients had high risk score i.e. more than 4 and out of them 44.2% had three vessel coronary artery disease. It was concluded that TIMI risk score is significantly associated with single vessel CAD ( $p < 0.02$ ) and three vessel CAD ( $p < 0.04$ ).<sup>7</sup> The correlation between TIMI score and severity of CAD was  $r = 0.556$ .<sup>9</sup>

The results of available local study varies from the international study e.g. single vessel disease was found among 27.5% patients in TIMI score less than 4 while 12 % in other class of TIMI score more than 4 in our local study.<sup>7</sup> While in international study single vessel disease was found among thirty five (28.9%) patients with TIMI score 0-2, in thirty five (35%) patients with TIMI score 3-4, while

it was found in no (10%) patient with TIMI score 5-7.<sup>8</sup> To confirm these results a correlation study is planned.

An international study has shown a positive correlation of  $r = 0.56$ . As the prevalence of CAD is high in Pakistan, local studies are required. We may have evidence based response whether to manage patient conservatively or to adopt invasive approach by doing coronary angiography and percutaneous intervention. Thus mortality and morbidity will be improved by managing patients by assessment done at bed side. If a positive correlation is found then TIMI risk score can be utilized to assess the severity of CAD without using invasive, expansive and time consuming investigations.

## MATERIAL AND METHODS:

It was a cross-sectional, observational survey performed in Cardiology Department (PIC), Lahore over a duration of six months, from 31st October 2013 to 30th March 2014. Using consecutive sampling, 131 patients with NSTEMI with age between 30 to 70 years of either sex, new onset or worsening chest pain, without acute ST elevation MI or left sided bundle branch block and elevated cardiac Troponin-I  $\geq 0.2$ ng/ml on admission were enrolled. Sample size of 131 cases was calculated taking type-I error as 5% and type-II error 10% with an expected correlation between TIMI score and severity of CAD as 0.556.<sup>9</sup> Patients with ST-segment elevation on their admission ECG indicative of ST-elevation myocardial infarction (STEMI), new onset left bundle branch block, unstable angina (diagnosed as having chest pain with ST-segment depressions or T wave inversions on ECG and normal cardiac troponin-I) and past history of ischemia heart disease were excluded. NSTEMI was labeled as new onset or worsening chest pain, without ST-segment elevation or left bundle branch block on ECG and elevated cardiac troponin-I  $\geq 0.2$ ng/ml). Modified GENSINI score on angiography was used to measure the extent of coronary vessels involvement.

## DATA COLLECTION PROCEDURE:

Patients who presented with NSTEMI in emergency of PIC were included. Informed consent was taken. Risk stratification of each patient was done by asking about presence or absence of risk indicators which were the part of TIMI risk score i.e. age, coronary artery disease risk factors (diabetes mellitus, hypertension, smoking, hyperlipidemia, family history), significant stenosis of coronary vessels on previous record, ST-segment depression, cardiac biomarkers, anginal symptoms and

previous use of aspirin. The calculated score was graded from 0-7 according to number of TIMI risk factors present. All this data was collected using the proforma attached. Angiography of each patient were then performed and severity of CAD using modified GENSINI score was assessed by two experienced operators from the angiographic findings. Findings of angiography were recorded on proforma in terms of angiographic severity of CAD (as per operational definition).

**DATA ANALYSIS:**

SPSS version 20 was used to analyzed the data. Variables (Quantitative) like age, TIMI risk score and GENSINI score were presented by mean ± standard deviation. Variables (Qualitative) like gender were presented as frequency and percentage. Spearman correlation will be applied to determine the correlation of extend of coronary artery disease with TIMI risk score. Less than 0.05 p value was significant.

**RESULTS:**

There were 131 patients. 96 patients (73.3%) were male while remaining 35 (26.7%) were female (Table I). The mean age was 57.73 ± 6.974 ranging from 30 year to 70 years of age. Mean calculated TIMI score was 3.90 ± 1.593 ranging from 1 to 7 while mean calculated Gensini score was 69.08 ± 11.348 ranging from 35 to 85. (Table II)

To determine the correlations in TIMI Score and Gensini Score, Pearson correlation was calculated. The correlation came out strong (r=0.774) with significant p value (< 0.001). However mean TIMI

**Table-1: Frequency distribution of sampled population by Gender**

		Frequency	Percent
Valid	Male	96	73.3
	Female	35	26.7
	Total	131	100.0

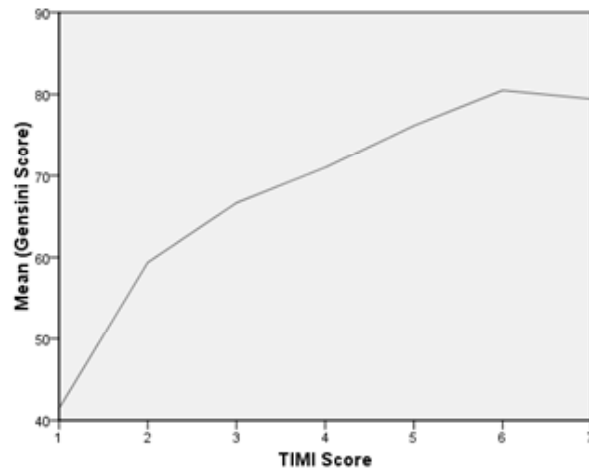
**Table-2 : Distribution of sampled population (Age, TIMI score and Gensini Score)**

	n	Minimum	Maximum	Mean	Std. Deviation
Age in Years	131	45	70	57.73	6.974
TIMI Score	131	1	7	3.90	1.593
Gensini Score	131	35	85	69.08	11.348

**Table-3 :Correlations between TIMI Score & Gensini Score**

	Mean	Std. Deviation	n
TIMI Score	3.90	1.593	131
Gensini Score	69.08	11.348	131

r (Pearson Correlation) =0.774, p value=.0001



**Figure 1: Correlation between GENSINI & TIMI Risk Score**

Score was 3.90 ± 1.593 and Gensini Score was 69.08 ± 11.348. (Table 3).

**DISCUSSION:**

Majority of patients with acute cardiac emergencies like ACS and its related complications are predisposed to increased mortality. The patients should be risk stratified by using different risk scores e.g. TIMI risk score etc. to provide better management. These patients undergo revascularization procedures after coronary angiography and angiographic lesions can be measured by using Gensini Score. TIMI risk score ranging from 1 to 7 points is related to subsequent outcome (4.7% - 40%). Giglioli et al. in his study showed no significant difference in mortality and cardiac ischemia in relation to time of symptoms. But he was able to conclude the study by showing the higher TIMI risk score the higher the mortality.<sup>10</sup> In our study there was important correlation between TIMI risk score and Gensini score (Pearson correlation r=0.774). Patients having low TIMI risk score need medical management while the patients with elevated TIMI risk score need to have percutaneous coronary intervention. Eren et al. has reported that as TIMI score increases the mortality rate also have a rising trend.<sup>11</sup>

Lakhani et al. included patients admitted with acute coronary syndrome who had TIMI score more than 4 were showed to have more than 70% disease in coronary vessel.<sup>12</sup> These results are in favor of our study results which also showed a correlation between TIMI and Gensini score.

Another scoring system is GRACE risk score which determined in hospital mortality after six months. It has a good predictive power and is

preferred over TIMI risk score in some countries. But TIMI risk score is most commonly used and accepted due to its easy usage. De Araujo Goncalves et al in his study assess TIMI risk score and concluded that it has moderate predicting power at one year.<sup>13,14</sup> PURSUIT score is also used clinically in acute coronary syndrome patients but is less powerful than TIMI and GRACE risk score. TEKHARF study conducted in Turkey showed that age is most significant risk factor when considered in view of TIMI and Gensini score.<sup>15-17</sup> Karnounos et al. evaluated relationship of gender with this score and no statistically significant difference was identified.<sup>18</sup> In our study most of the patients were male.

Hess et al. reported TIMI score as a tool for prognosis. In our study it was noticed that the more the TIMI risk score, the more severe lesion were present. In our study TIMI and Gensini score were proportional and can be applied during clinical evaluation of patients with acute coronary syndrome.<sup>19,20</sup>

### CONCLUSION:

Correlation between severity and extent of coronary artery lesions on angiography with different score categories of Thrombolysis in Myocardial Infarction (TIMI) risk score in patients presenting with non-ST-elevation myocardial infarction is linear and strongly positive ( $r=0.774$ ) showing validity of TIMI risk score in our population.

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