Original Research Article

ASSOCIATION BETWEEN TIMI RISK SCORE AND SEVERITY OF CORONARY ARTERY DISEASE IN NON-STEMI CASES

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Abstract: *This study aimed to evaluate the relationship between TIMI risk score and the extent of coronary artery disease in non-STEMI patients. A descriptive prospective study was conducted in the Department of Cardiology of Chaudhary Pervez Elahi Institute of Cardiology, Multan, from 3rd June 2021-3rd June 2022. 237 patients admitted with NSTEMI within 7 days of admission were included. Baseline demographic characteristics were noted in a performed performance. The TIMI score for all patients was calculated. All patients underwent coronary angiography and the Gensini score was calculated. Average patients' age was 54.44±9.10 years. The mean genuine score was 37.17±5.62, and the TIMI score was 3.93±1.42. There were 162 (68.35%) male and 75 (31.65%) female patients. Diabetes was found in 83 (35.02%) and hypertension in 124 (52.32%) patients. Family history of CAD was found in 54 (22.78%) patients, and hypercholesterolemia in 57 (22.05%) patients. TIMI score significantly correlated with Gensini score with a correlation coefficient (r) of 0.50 and p-value <0.0001. It is concluded that in NSTEMI patients, clinical risk stratification as determined by TIMI risk score is associated with the determined extent of the disease via the Gensini score.*

Keywords: Thrombolysis in myocardial infarction risk score, Gensini score, non-ST-elevation myocardial infarction

Introduction

Cardiovascular diseases (CVDs) have the highest mortality rate worldwide. Both genders are equally affected by these diseases and represent 50% of the non-communicable disease (NCD) (Health, 2018). In the United States, nearly 8 million people report chest pain annually, thus being the 2nd biggest cause of adult hospital visits (Hsia et al., 2016). Individuals affected with on-ST segment elevation ACS vary in terms of age and gender hence varied morbidity and mortality risk. It is significant to assess the risk to better treat the patients (Shaikh et al., 2014). Patients at high risk of developing adverse effects may show good results with improved treatment, including coronary interventional procedures and cardiac medication (Lindholm et al., 2017). Gensini score is useful for determining the extent of CAD, but it is necessary to perform an invasive procedure i.e coronary angiography to obtain this scoring (Zhou et al., 2016). TIMI score helps in prognostic management of high morbidity of cardiovascular events (Mok et al., 2018). It is a strong predictor the mortality and disease progression in new patients (Numasawa et al., 2013). Santos et al. conducted a study on risk scores relationship with coronary anatomy. A positive relationship between TIMI risk score and coronary

lesion equal or less than 50% (TIMI r = 0.363) was reported. They reported the TIMI risk score as the best predictor for the severity of coronary artery disease (Santos et al., 2013). Butt U.M. et al. performed a similar study and TIMI score and Gensini score was 4.68±1.33 and 21.54±4.108 respectively. The correlation was significant (0.47) (Butt et al., 2018). The relationship between TIMI score and severity of CAD is crucial as patients with acceptable TIMI risk scores and low risk symptoms of ACS can be risk stratified without any invasive procedure which is also a cost-effective approach. This study has been planned to assess the association of TIMI risk score and the extent of CAD in non-STEMI patients.

Methodology

A descriptive study was conducted at the Department of Cardiology, Chaudhary Pervez Elahi Institute of Cardiology, Multan, for the duration of 6-months from 3rd June 2021 to 3rd June 2022 after approval ref# 12-48 dated 18-05-21 from the hospital Ethical Review Board. Using the PASS version 11 formula for one sample correlation, A sample size of 237 was calculated. Where the Power of the study was 80 %,

the correlation coefficient of TIMI and Gensini score was 0.47 [10], the alternative hypothesis (Ha) correlation = 0.60, and a significance level of 0.05. Non-probability consecutive sampling technique was used. Patients, both male and female, aged between 40-70 years admitted with NSTEMI within seven days of admission were selected for the study. Al patients provided their written consent to be included in the study. Patients with echocardiogram showing left bundle branch block, history of cardiac revascularization, and known cases of chronic kidney disease (on medical records, serum creatinine > 1.2 mg/dl) were not included in the study. Patients presenting with left-sided severe excruciating chest pain radiating to the jaw, left arm, or back for ≥ 30 minutes plus 12-lead ECG showing ST-depression in any of the two consecutive leads and troponin-T > 0.4 ng/ml were deemed positive for NSTEMI. Any person who has smoked ≥ 100 cigarettes in a lifetime was labeled a smoker. A patient who was known cases of diabetes mellitus for $\geq$ one year and was on anti-diabetic treatment or HbA1c level of more than 6.5 were deemed positive for diabetes mellitus. Hypertension was labeled if a patient has a history of hypertension $\geq$ one year and is on antihypertensive therapy. Serum cholesterol > 200mg/dl in the fasting blood sample was deemed positive for hypercholesterolemia. TIMI score was calculated using the patient's age (in years), risk factors of coronary artery disease (CAD), previous history of CAD, aspirin use, severe angina, ECG changes, and cardiac markers. Gensini's score was calculated after coronary angiography. It is used for quantifying coronary atherosclerosis and accounts for the location and degree of narrowing (compared to the nearby normal vessel).

Baseline data, including age, sex, smoking status, diabetes mellitus, hypertension, and family history of CAD was noted. All the patients underwent testing for cardiac troponin-T. The test was done from a single laboratory. The TIMI score for all patients was calculated. All the patients underwent coronary angiography. The angiography was reported by a consultant cardiologist with at least five-year of post-fellowship experience. Gensini's score was calculated. All the data was noted on the performance specifically designed for the study. All the data collected was evaluated by SPSS 23. Mean and standard deviation was used to present factors like age, GENSINI score, and TIMI Score. Categorical variables like sex, smoking status, hypertension, family history of CAD and diabetes mellitus were presented as frequency and percentages. The Pearson correlation (r) was calculated between TIMI and GENSINI scores. A two-tailed test was applied for significance. The data were stratified on gender, smoking, hypertension, family history of CAD and diabetes mellitus to see the effects on the correlation between TIMI and GENSINI score. A p-value ≤ 0.05 was considered as significant.

Results

The average age of patients included in this study was 54.44 ± 9.10 years. There were 162 (68.35%) male and 75 (31.65%) female patients. 87 (36.71%) patients were smokers, 83 (35.02%) patients were diagnosed with diabetes, 124 (52.32%) patients had hypertension, 54 (22.78%) patients had a family history of CAD, and 57 (22.5%) had hypercholesterolemia. The average GENSINI score and TIMI score was 37.17 ± 5.62 and 3.93 ± 1.42 respectively. The correlation between Gensini and TIMI score was calculated and shown in Table I. Stratification based on age, gender, smoking status, diabetes, hypertension, and family history is shown in Table II.

Table I: Correlation of Gensini's Score and TIMI score

	Gensini's score	TIMI score	Correlation Coefficient (r)	P-value
Mean	37.17	3.93	0.50	<0.0001
S.D.	5.62	1.42		

Table II: Stratification of data based on risk factors of CAD

Risk Factors	Gensini's Score	TIMI Score	Cor-relation Coeff.	P-Value
Age 40-54 years	36.72±6.60	3.86±1.47	0.51	0.29
Age 55-70 years	37.62±6.65	4.00±1.37	0.51	0.46
Males	37.56±6.51	3.90±1.42	0.44	0.18
Females	36.33±6.82	4.01±1.43	0.66	0.55
Smokers	38.13±6.86	3.95±1.45	0.50	0.09
Diabetes	37.64±7.11	4.10±1.32	0.54	0.42
Hyperten-sion	37.44±6.87	3.93±1.41	0.61	0.51
Family history	37.83±6.94	3.67±1.33	0.43	0.40
Hyperchol-esterolemia	37.50±6.39	3.70±1.32	0.50	0.18

Discussion

The risk and mortality of non-ST elevation ACS varies greatly due to heterogenous patients affected by it (Linde, 2020, Sarma,2019). Hence, the evaluation

risk stratification is significant while examining patients with initial complaint to predict the disease prognosis and treatment plan. Several studies have been conducted to evaluate the risk stratification in NSTEMI patients to predict risk of myocardial infarction and mortality (Liu, 2018). It is a prediction tool that helps prevent mortality risk and cardiovascular events initially in coronary artery disease patients. It also helps to identify the target population of early invasive procedure. PRISM-PLUS trial and TACTICS-TIMI1 trials have validated this score (Chen, 2018). Gensini score is used to assess the severity of CAD by coronary angiography. A significantly positive correlation between the TIMI score and the extent of coronary artery disease using the GENSINI score was observed. We found a significant positive association between the TIMI score and GENSINI scores (p-value <0.0001). Our results are in compliance with previous research. Another study conducted on 112 patients also reported a positive association between Gensini score and TIMI score (p = 0.02), however, this relationship was not significant (r = 0.27) (Barbosa et al., 2012). Lakhani et al. concluded that patients with Thrombolysis in Myocardial Infarction score less than 4 developed three vessels CAD (62%) in comparison to individuals with TIMI risk score more than 4 (46.2 %) (p < 0.04) (Lakhani et al., 2010). Previous studies also found that the relationship between TIMI score and extent of CAD by Gensini score was significant (Butt et al., 2018; Sattar et al., 2019). We noted that there was no association between the age and this association. Similarly, a strong correlation existed for both males and females. The association between correlation strength with diabetes and other risk factors was insignificant.

Our study also has limitations. This study represents the experiences of a single institution with small sample size. Multi-institutional studies with larger sample size must be encouraged to understand the relationship between the TIMI score and extent of CAD using the GENSINI score so that patient gets more benefit and physicians can make an easy decision for intervention based on strong evidence.

Conclusion

It is concluded that in NSTEMI patients, risk stratification by TIMI risk score is associated with the determined extent of the disease via the Gensini score.

Conflict of interest

The authors declared absence of conflict of interest.

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