



# CORRELATION BETWEEN GRACE AND SYNTAX SCORES IN PATIENTS WITH ACUTE CORONARY SYNDROME

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## ABSTRACT

**BACKGROUND AND OBJECTIVE:** GRACE is a clinical scoring tool used to predict in-hospital mortality in patients with acute coronary syndrome. SYNTAX is an angiographic scoring system to decide the optimal revascularization strategy. The objective of the study was to determine the correlation between the two scoring systems in patients with Acute Coronary Syndrome.

**METHODOLOGY:** This was a cross sectional study conducted at Mayo Hospital Lahore in 2015-16. A total of 200 patients fulfilling the selection criteria were enrolled in the study. The demographics information like age, gender was noted. Then patients were examined to measure the GRACE risk score at the time of admission. Then patients underwent cardiac catheterization and SYNTAX score was measured using its software. Data was analyzed to see correlation between two scores.

**RESULTS:** Mean age of the study population was 60.34±8.14 years and 62%(n=124) were male. Mean GRACE risk score was 138.56±7.88 and mean SYNTAX score was 28.69±4.86, the value of 'r' (correlation coefficient) was 0.8514 indicating a strong positive correlation, The value of r<sup>2</sup>, the coefficient of determination, was 0.7249.

**CONCLUSION:** There is strong correlation between GRACE and SYNTAX scores in patients hospitalized with acute coronary syndrome.

**KEYWORDS:** Acute Coronary Syndrome, GRACE risk score, SYNTAX score

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## INTRODUCTION

Coronary Artery Disease (CAD) has become the leading cause of death in Pakistan among the adult population as the South Asian population has the greatest susceptibility to develop CAD.<sup>1</sup> It usually presents as Acute Coronary Syndrome (ACS), which is the major cause of cardiovascular morbidity and mortality worldwide.<sup>2</sup>

ACS is a spectrum of diseases, pathologically, ranging from coronary artery stenosis to plaque rupture and thrombosis, and clinically comprising of Unstable Angina (UA), Non ST elevation Myocardial Infarction (NSTEMI), ST Elevation Myocardial Infarction (STEMI) and sudden cardiac death. Its timely diagnosis and appropriate management is the cornerstone for achieving the desired clinical

outcomes.<sup>2</sup>

Patients presenting with ACS are at increased risk of recurrent ischemic episodes, myocardial infarction and sudden cardiac death.<sup>3</sup> Early identification of such high risk patients, not only allows subsequent aggressive antithrombotic treatment but also stratification of those, who may benefit from early coronary angiography and Percutaneous coronary Intervention (PCI).<sup>4,5</sup> Many different risk stratification scores have been developed to aid such an early recognition and subsequent intervention.<sup>6-8</sup>

The Global Registry of Acute Coronary Event (GRACE) risk score was developed to predict in-hospital mortality across the spectrum of ACS in a large multinational registry, the GRACE study.<sup>9</sup> This score is a predictive logistic model.<sup>10</sup> Parameters used in Grace Risk scoring include age, heart rate, systolic blood pressure, creatinine, cardiac arrest at admission, ST segment deviation on ECG, abnormal cardiac enzymes and Killip class. RSYNTAX Score (Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery) is an angiographic tool used for the grading of the extent, severity and complexity of coronary artery disease.<sup>11-13</sup> In Syntax scoring, each lesion is characterized, mainly, on the basis of precise anatomic

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location, length, calcification, thrombus, tortuosity and bifurcation / trifurcation type.

Previously published studies have reported different strengths of correlation between GRACE and SYNTAX scores with 'r' ranging from 0.260 (P=0.001)<sup>9</sup> to 0.338, (p<0.001).<sup>8</sup>

The rationale of this study was to determine the correlation between GRACE risk score and SYNTAX score in patients with Acute Coronary Syndrome. It is known that GRACE and SYNTAX are highly reliable in predicting outcome and the severity of coronary artery disease respectively in ACS patients. Very little work has been done in finding the correlation between SYNTAX and GRACE risk scores and no local data could be found in this regard.

### CORONARY ARTERY DISEASE

- Grace risk score was calculated at the time of presentation by clinical evaluation. Grace score >140 are high score categories and ≤ 140 are low risk categories
- Syntax score was calculated after coronary angiography within 7 days of presentation. It was measured on angiography in terms of % blockage of coronary artery by stenosis or thrombus. The SYNTAX score >27 are high score categories and ≤ 27 are low risk categories

### MATERIAL AND METHODS:

This was a Cross Sectional study conducted at Department of Cardiology, Mayo Hospital Lahore from October 2015 to April 2016. Sample size of 200 cases was calculated with 5% type I error, 10% type II error and taking magnitude of Correlation Coefficient i.e. r= 0.260 between GRACE and SYNTAX score to assess the severity of CAD in ACS patients. Non-probability consecutive sampling technique was used. Patients aged 40-80 years from either gender presenting with ACS and diagnosed in last 24 hours were enrolled. Consent was obtained from all patients after explaining the purpose of study. Patients with renal diseases (creatinine>1.5mg/dl or on hemodialysis), liver disease (AST>60 IU/L, ALT>60IU/L) or history of prior CABG and/or PCI were excluded. The demographics information like age and gender were noted. The patients were examined to measure the GRACE risk score. After cardiac catheterization, SYNTAX score was measured. Both scores were calculated using the concerned software. The information thus obtained was recorded on a pre- designed Performa. The cutoff values used to define high risk were >140 for GRACE and >27 for SYNTAX.

### STATISTICAL ANALYSIS:

Data was analyzed using SPSS version 21.0. Mean and Standard deviation was calculated for quantitative variable like age, GRACE and SYNTAX scores. Frequency and percentage was calculated for qualitative variables like gender, high/low risk on grace and syntax score. Pearson Correlation Coefficient was calculated between GRACE and SYNTAX score taking p-value≤0.05 as significant. Data was stratified for age, gender, artery involved to deal with effect modifiers. Post stratification correlation was applied. P-value ≤0.05 was considered significant.

### RESULTS

Two hundred patients were studied. Mean age was 60.34+8.14 years. Frequency of patients in different age groups is shown in Figure 1. Gender distribution of the study population is shown in Table 1.

Mean Grace Risk Score was 138.56+7.88 and mean Syntax Score was 28.69+4.86, the value of 'r' was 0.8514 which indicates a strong

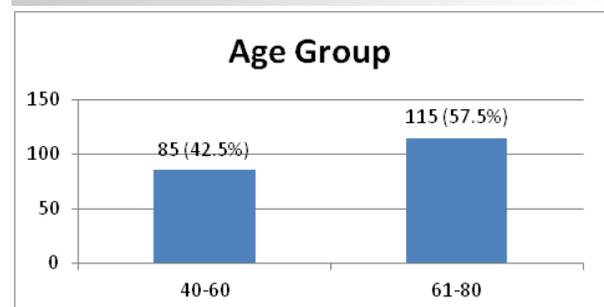
**Table-1: Gender Distribution (n=200)**

Gender	No. of patients	%age
Male	124	62
Female	76	38

**Table-2: Comparison of GRACE and SYNTAX score with respect to age group, gender and the vessel involved**

Variables		GRACE Score	Syntax Score	"R" value	R <sup>2</sup> value
Age Group	40-60	138.88 ± 8.32	29.25 ± 8.32	0.8341	0.6957
	61-80	138.32 ± 4.86	28.27 ± 4.86	0.8693	0.7557
Gender	Male	136.96 ± 7.87	28.10 ± 4.86	0.8455	0.7149
	Female	137.56 ± 7.23	28.88 ± 4.84	0.8583	0.7249
Vessel	LAD	137.45 ± 7.41	28.79 ± 4.78	0.8347	0.7289
	LCx	135.67 ± 7.25	27.95 ± 5.06	0.8134	0.7218
	RCA	138.75 ± 7.73	28.34 ± 5.22	0.8214	0.7143

**Figure 1 age (years) groups (n=200)**





positive correlation meaning that high Syntax Score goes with high Grace Risk score and vice versa. The value of R<sup>2</sup>, the coefficient of determination, was 0.7249.

Comparison of GRACE and SYNTAX scoring system in different age groups, gender and with individual coronary artery is shown in Table 2. Considering  $R > 0.5$  a strong correlation, we found a strong correlation between these two scoring systems in all age groups, both genders and with each coronary involvement.

## DISCUSSION

In this single center study, we observed a strong correlation between GRACE risk score and SYNTAX score in patients with acute coronary syndrome. The practical implication of this correlation is that patients with higher GRACE risk score at presentation are more likely to undergo CABG or a complex Percutaneous procedure as a revascularization strategy.

Previously, a study has reported that the correlation between GRACE and SYNTAX was found to be positive and significant i.e.  $r=0.260$  ( $P=0.001$ ).<sup>9</sup> Another study reported an even stronger correlation i.e.  $r=0.338$ ,  $p<0.001$ .<sup>8</sup> These findings are in agreement with our findings.

Yin Yanping et al<sup>14</sup> evaluated the relationship of GRACE risk score and severity of the coronary lesions in patients with acute myocardial infarction (AMI) and recorded that as the results of GRACE

risk score increase, the scope and degree of coronary stenosis also increased proportionately. They concluded that GRACE risk score can be used to evaluate the degree of actual coronary artery stenosis.

Regarding SYNTAX score, it has many potential applications both in daily clinical practice and for research purposes. First, it provides the interventional cardiologists a powerful stratification tool, allowing uniform, standardized assessment of CAD extent and severity. Second, it may guide clinicians who are deciding upon the most appropriate revascularization modality, especially in complex CAD, and this fact has been recently endorsed in both American and European coronary revascularization guidelines (Class IIa recommendation).<sup>15-17</sup>

There are many studies that support the utility and efficacy of both scores for prediction of outcome in acute coronary syndrome. However, very limited local data was found to compare our results regarding correlation of these two modalities. The findings of our study are primary and there is a need for some other studies on local population for its validation.

We concluded that the correlation between GRACE risk score and SYNTAX score in patients with Acute Coronary Syndrome is strong enough to predict the severity, extent and complexity of angiographic coronary artery disease at the time of admission.

## Author's Contribution

FZ: Conducted the study and wrote the article.

AMA: Re-analyzed data, reviewed and corrected the article. AT and MM: Helped in conducting the study and was research coordinator



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