

GRACE SCORE IN ASSESSING THE IN-HOSPITAL MORTALITY OF ACS AND THE EVALUATION OF RISK FACTORS

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ABSTRACT

BACKGROUND

In India, cardiovascular diseases account for 25% of the total deaths. The survival of patients with acute myocardial infarction has improved considerably during the past 10 years with the advent of PCI & cardioprotective drugs. Despite this improvement, mortality rates after MI continue to demonstrate an early rise. Therefore, risk stratification is necessary to identify high risk patients. There are various risk scores to predict mortality & recurrent ischemic events like TIMI score,¹ PURSUIT score,² Framingham risk score,³ Reynolds risk score,⁴ HEART score & GRACE score of which GRACE risk score is more accurate.

MATERIALS AND METHODS

This study was conducted in Kanyakumari Government Medical College in the Department of General Medicine. 100 patients were included in this study over a period from August 2017-January 2018 for a period of 6 months. The details of the patient, their risk factors were noted & GRACE risk score is calculated.

RESULTS

The maximum number of cases in this study were in the age group between 60-69 years. 61% of the patients were males & 39% were females. Smoking was more prevalent in this study group with 54%, dyslipidaemia 46%, hypertension 44%, alcohol 43% & diabetes 42%. Most of patients of NSTEMI are in low risk & STEMI are in high risk category. All the patients who expired had high Grace risk scores. Heart rate at the time of admission >110 bpm, SBP <80 mmHg, serum creatinine value >2 & KILLIP CLASS IV are associated with high mortality ($p < 0.01$).

CONCLUSION

GRACE RISK SCORE is highly accurate in predicting in hospital mortality in patients with ACS. We should routinely use GRACE risk score in our hospital settings to identify the high-risk patients. Early invasive management should be done for patients with high scores.⁵

KEYWORDS

Grace risk score, Killip class, Acute coronary syndrome, In hospital mortality.

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BACKGROUND

Cardiovascular disease has become the leading cause of death worldwide.⁶ By 2030, WHO predicts that 33% of the deaths occurring worldwide will be caused by cardiovascular diseases. Keith Fox, Professor of Cardiology at the University of Edinburgh & Professor Joel Gore of the University of Massachusetts established a 10-year research program on ACS. The result was the Global Registry of Acute Coronary Events (GRACE).⁷ The GRACE risk score is more accurate⁸

because it was derived from a multinational registry of unselected patients & includes hospitals in Europe, Asia, North America, South America, Australia & New Zealand. Risk assessment should be performed at the time of hospital admission as it gives an idea about probability of in hospital death & also guides the appropriate treatment plan in acute coronary syndrome.

Eight parameters are used for calculating GRACE score that include patient's-

- Age
- Heart rate
- Systolic blood pressure
- Killip class
- Serum creatinine level
- Cardiac arrest at hospital admission
- ST-segment deviation in ECG
- Elevated cardiac markers

Sum of all 8 variables is GRACE risk score.

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Calculation of Grace Score

Age (years)	Score
≤ 30	0
30-39	8
40-49	25
50-59	41
60-69	58
70-79	75
80-89	91
≥ 90	100

Table 1

Heart rate (bpm)	Score
≤ 50	0
50-69	3
70-89	9
90-109	15
110-149	24
150-199	38
≥ 200	46

Table 2

Cardiac Arrest at Hospital Admission	Score
Absent	0
Present	39

Table 3

Elevated Cardiac Marker	Score
Absent	0
Present	14
ST-segment deviation in ECG	Score
Absent	0
Present	28

Table 4

Killip Class	Score
I - No heart failure	0
II - Crackles audible in lower half of lung field	20
III - Crackles audible in whole lung field	39
IV - Cardiogenic shock	59

Table 5

SBP (mm Hg)	Score
≤ 80	58
80-99	53
100-119	43
120-139	34
140-159	24
160-199	10
≥ 200	0

Table 6

Serum creatinine (mg/dl)	Score
0-0.38	1
0.39-0.79	4
0.80-1.19	7
1.20-1.58	10
1.59-1.90	13
2.0-3.99	21
≥ 4	28

Table 7

Non STE-ACS- In-Hospital Mortality⁹

Risk Category	GRACE Risk Score	Probability of Death In-hospital (%)
Low	1-108	<1
Intermediate	109-140	1-3
High	141-372	>3

Table 8

STE-ACS- In-hospital Mortality

Risk Category	GRACE Risk Score	Probability of Death In-hospital (%)
Low	49-125	<2
Intermediate	126-154	2-5
High	155-319	>5

Table 9

MATERIALS AND METHODS

Aims and Objectives-

- Risk assessment in acute coronary syndrome by using GRACE risk score.
- Correlate Grace risk score & predict in hospital mortality in patients with ACS.
- To identify the risk factors for myocardial infarction in Kanyakumari district.

Design of Study

Observational cross sectional study. This study was conducted in Kanyakumari Government Medical College in the Department of General Medicine. 100 patients were included in this study over a period from August 2017-January 2017 for a period of 6 months. The details of the patient, their risk factors were noted & GRACE risk score is calculated.

Inclusion Criteria

- Patients who were diagnosed having ACS (based on Universal Definition of MI)¹⁰
- Detection of rise & fall in cardiac biomarker values with atleast one of the following symptoms of ischemia.
- New or presumed new significant ST-T wave changes or new LBBB.
- Development of pathologic Q waves.
- Imaging evidence of new loss of viable myocardium or new RWMA.
- Identification of an intracoronary thrombus by angiography or autopsy.

- Unstable angina
- The diagnosis established by angina pectoris or equivalent ischemic discomfort.

Exclusion Criteria

- Patients who were already having CAD.
- Patients who did not give consent.

RESULTS

- The maximum number of cases in this study were in the age group between 60-69 years followed by 50-59 years as shown in fig. 1.
- 61% patients were males & 39% were females as seen in fig. 2.
- Out of the risk factors smoking was more prevalent in this study group with 54% & other risk factors depicted in fig. 4.
- Most of patients of NSTEMI are in low risk & STEMI are in high risk category as shown in Table 1 & fig. 5.
- All the patients who expired had high Grace risk scores irrespective of type of MI (fig. 6).
- Heart rate at the time of admission >110 bpm is highly significant for adverse events (Table 2).
- SBP <80 mmHg is highly significant to predict mortality (P<0.01) -Table 3.
- Serum creatinine value >2 is associated with high mortality (p<0.01) - Table 4.
- KILLIP CLASS 4 is highly significant (p<0.01) – (fig. 7).
- Very high Grace score is associated with 100% mortality (fig. 8).

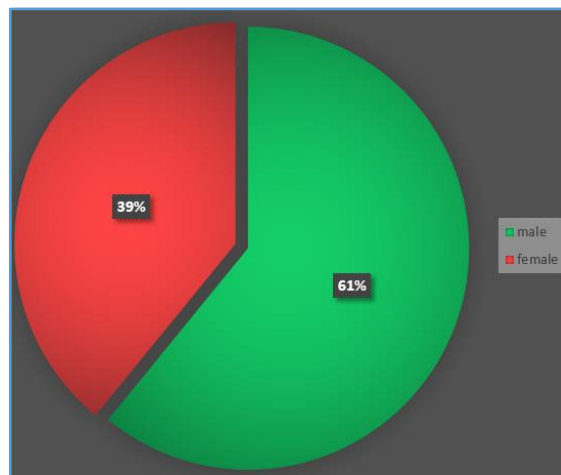


Figure 2. Gender Distribution

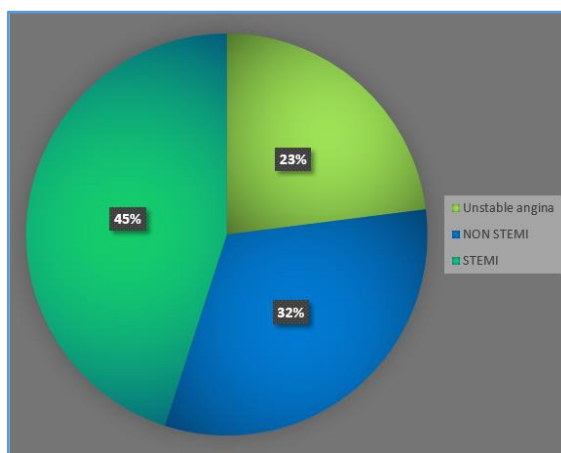


Figure 3. Type of Acute Coronary Syndrome

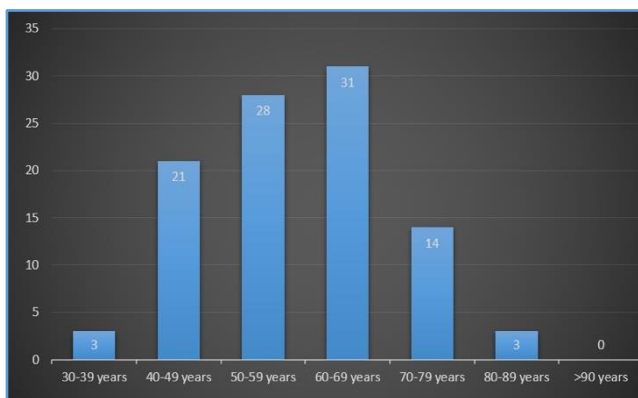


Figure 1. Age Distribution

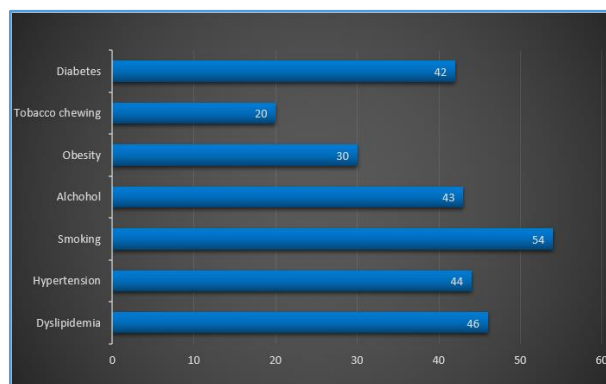


Figure 4. Risk Factor Profile

Grace Risk Score	NSTEMI/UA	STEMI	No. of Patients Expired
LOW RISK CATEGORY 1-108 FOR NSTEMI 49-125 FOR STEMI	29 (52.72%)	9 (20%)	0
INTERMEDIATE RISK CATEGORY 109-140 FOR NSTEMI 126-154 FOR STEMI	16 (29.09%)	13 (28.89%)	0
HIGH RISK CATEGORY 141-372 FOR NSTEMI 155-319 FOR STEMI	10 (18.18%)	23 (51.11%)	2 (3.6%) IN NSTEMI 7 (15.55%) IN STEMI

Table 10. Comparison of In-Hospital Mortality with Grace

Risk Score

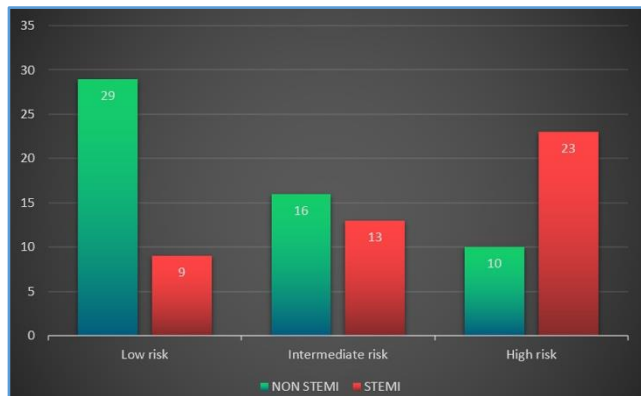


Figure 5. Comparison of Grace Risk Score between NSTEMI/UA & STEMI

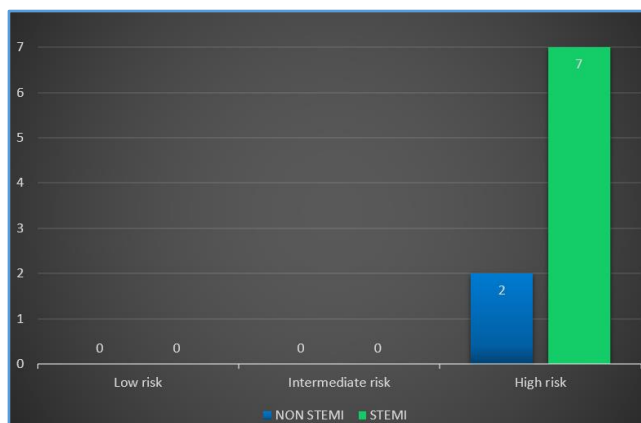


Figure 6. Comparison of in-hospital Mortality with Grace Risk Score

Heart Rate (beats/min)	No. of Patients Expired	Percentile
<50	0	0%
50-69	0	0%
70-89	0	0%
90-109	1	1%
110-149	5	5%
150-199	3	3%
>200	0	0%

Table 11. Correlate Heart Rate at the Time of Admission with Mortality

SYSTOLIC BP (mmHg)	No. of Patients Expired	Percentile
<80	5	5%
81-100	2	2%
101-119	0	0%
120-159	1	1%
160-199	1	1%
>200	0	0%

Table 12. Correlate Systolic BP at the Time of Admission with Mortality

Serum Creatinine (mg/dl)	No. of Patients Expired	Percentile
0.8 -1.19	0	0%
1.20-1.58	0	0%
1.59-1.90	2	2%
2.0-3.99	5	5%
>4	2	2%

Table 13. Correlate Serum Creatinine with Mortality



Figure 7. Correlation of Killip Class with Mortality

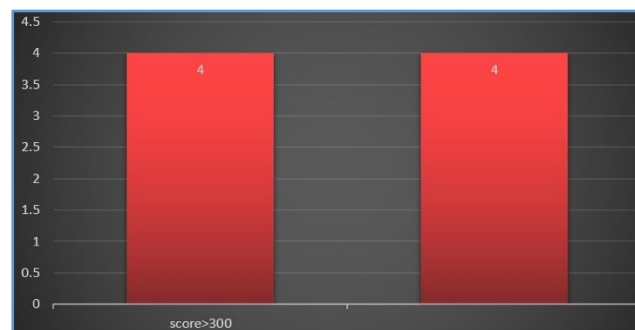


Figure 8. Very High Grace Risk Score and Mortality

CONCLUSION

Grace Risk Score has got a statistically significant correlation with in hospital mortality with a P value of <0.001.

In the components of GRACE Risk Score Heart Rate, Systolic Blood pressure, Serum Creatinine, Killip Class have statistically significant correlation (p<0.01) with In Hospital Mortality. This study has shown GRACE RISK SCORE is highly accurate in predicting in hospital mortality in patients of Acute Coronary Syndrome. We should routinely use GRACE risk score in our hospital settings to identify the high risk patients so that early invasive management can be done for patients with high scores & mortality could be reduced.

REFERENCES

- [1] Antman EM, Cohen M, Bernink PJ, et al. The TIMI risk score for unstable angina /non-ST elevation MI: a method of prognostication and therapeutic decision making. JAMA 2000;284(7):835-842.
- [2] Boersma E, Pieper KS, Steyerberg EW, et al. Predictors of outcome in patients with acute coronary syndromes without persistent ST-segment elevation. Results from an international trial of 9461 patients. The PURSUIT Investigators. Circulation 2000;101(22):2557-2567.

- [3] Risk assessment tool for estimating your 10 year risk of having heart attack.
<http://hp2010.nhlbihin.net/atp/iii/calculator.asp>.
- [4] Calculating heart and risk scores for women and men.
<http://www.reynoldsriskscore.org>
- [5] de Araújo Gonçalves P, Ferreira J, Aguiar C, et al. TIMI, PURSUIT, and GRACE risk scores: sustained prognostic value and interaction with revascularization in NSTEMI-ACS. *Eur Heart J* 2005;26(9):865-872.
- [6] Zipes DP, Libby P, Bonow RO, et al. Global burden of cardiovascular disease. In: Braunwald's heart disease: a textbook of cardiovascular medicine. Vol. 2. 11th edn. Elsevier 2018.
- [7] The GRACE risk score: assessing heart attack risk and guiding treatment. 2016. <http://www.ed.ac.uk>.
- [8] Granger CB, Goldberg RJ, Dabbous O, et al. Predictors of hospital mortality in the global registry of acute coronary events. *Arch Intern Med* 2003;163(19):2345-2353.
- [9] Grace ACS Risk Score 2.0. www.gracescore.org.
- [10] Thygesen K, Alpert JS, Jaffe AS, et al. Third universal definition of myocardial infarction. *Circulation* 2012;126:2020-2035.