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Correlation Between Pursuit Score And Severity Of Coronary Artery Lesion Assessed by Syntax Score Among Non-ST-Segment Elevation Myocardial Infarction (NSTEMI) Patients in Adam Malik Hospital Medan

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ABSTRACT

Introduction: The PURSUIT score is a practical risk score for patients with acute coronary syndromes to assess prognosis and risk stratification. Prognosis and revascularization options in patients with multivessel disease can be determined based on the severity of coronary lesions based on angiography. However, only a few studies have investigated the association of this score with coronary lesion severity. This research is aim to evaluate correlation between PURSUIT score and severity of coronary artery lesions assessed by SYNTAX score in patients with NSTEMI at H.Adam Malik General Hospital Medan.

Method: This research was a cross-sectional study in which the sample was taken by consecutive sampling at H. Adam Malik General Hospital in Medan on 70 patients diagnosed with NSTEMI. The hypothesis was evaluated using Pearson's correlation test for normally distributed numerical data or Spearman's correlation test for abnormally distributed data. The p value of 0.05 indicates statistical significance.

Results: Mean PURSUIT score in this research was 11.0 + 3.31, while mean SYNTAX score was 25.6 + 10.8. A positive correlation was found between the PURSUIT score and the SYNTAX score with a low strength level (r = 0.258).

Conclusion: The PURSUIT score has a weak correlation in predicting the complexity of coronary angiography among NSTEMI patients

Keywords

Acute myocardial infarction, NSTEMI, PURSUIT score, SYNTAX score

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INTRODUCTION

Coronary heart disease (CHD) is a disease caused by plaque build-up in the coronary arteries that supply oxygen to the heart muscle. It is one of the most common cardiovascular diseases. The World Health Organisation (WHO) reported in 2013 that 17.5 million people die each year from cardiovascular disease, about 31% of total deaths worldwide. Approximately 75% of cardiovascular disease deaths occur in low-to middle-income countries. 80% of all deaths worldwide are caused by heart attacks and strokes. Meanwhile, in Indonesia according to Riskesdas in 2013, the prevalence of coronary heart disease based on doctor's diagnosis or symptoms was 1.5%. The incidence rate also increases with age, the highest in the age group 65-74 years at 3.6%. The highest cause of death after stroke is caused by coronary heart disease, which accounts for 12.9% of the total population, according to survey data in 2014. Almost half of these cardiovascular deaths were due to IMA.[1-2]

Acute coronary syndrome (ACS) is a life-threatening condition that can occur suddenly in patients with coronary artery atherosclerotic disease. It is a series of conditions ranging from unstable angina pectoris to extensive IMA, a condition of irreversible necrosis of the heart muscle.[3] SCA results from partial to total interruption of coronary blood flow to the myocardium caused by plaque rupture. SCA consists of unstable angina pectoris (APTS), acute myocardial infarction without ST segment elevation (IMANEST), and acute myocardial infarction with ST segment elevation (IMAEST).[4,5]

Therefore, several clinical predictors such as chest pain duration, age, positive cardiac biomarkers, ST-segment depression on ECG, presence of chronic heart failure help in predicting the high-risk group commonly known as GRACE (Global Registry of Acute Coronary Events) score which has been widely studied and clinically applied. However, in addition to the GRACE score, there is another clinical risk score that is quite potential in assessing and predicting the outcome of patients with APTS and IMAEST, namely the PURSUIT score (Platelet Glycoprotein IIb-IIIa in Unstable Angina, Receptor Suppression Using Integrilin Therapy) which has also been established by several studies in its role and benefits in risk stratification and predicting the prognosis of APTS and IMANEST patients.[6]

The severity of coronary heart disease can be assessed using the SYNTAX scoring system. The SYNTAX score is a comprehensively formulated scoring system to describe the complexity of coronary artery lesions based on angiographic results and predict the outcome of PCI or coronary artery bypass grafting (CABG).[7-8] The SYNTAX score quantifies the complexity of coronary artery lesions by taking into account not only the number of significant lesions and their location, but the complexity of each lesion independently. Higher SYNTAX scores indicate a more complex disease state and poorer prognosis.[8]

So far, there are few studies that have examined the association of PURSUIT risk score with coronary artery severity. Brilakis, et al. in 2003 conducted a study looking at the association of PURSUIT risk score with severity of coronary artery angiography results and mortality in the IMANEST community-based population. The study found that the PURSUIT risk score correlated with angiographic severity of coronary artery disease, as well as short- and long-term mortality of IMANEST patients, with higher PURSUIT risk scores associated with a greater likelihood of 3-vessel or left main artery disease (p value <0.001).[9]

Based on the variation in the results of these studies and considering that the PURSUIT score has practical potential in its use, the author aims to assess the relationship between the PURSUIT score and the severity of coronary artery lesions assessed by the SYNTAX score in IMANEST patients at H.Adam Malik Hospital Medan.

METHOD

This study is a cross sectional study, where sampling is done by consecutive sampling. In this way, researchers will take all research subjects with IMANEST diagnoses based on ECG and clinical and cardiac enzymes at H Adam Malik Hospital Medan. The study was conducted on IMANEST patients at RSUP HAM Medan who underwent coronary angiography at RSHAM from August 2022 until the sample size was met according to the sample size.

The target population is patients who experience IMANEST. The target population was patients who suffered from IMANEST and underwent coronary angiography at H Adam Malik Hospital Medan. The sample is the affordable population that fulfils the inclusion and exclusion criteria. The inclusion criteria for this study were patients aged more than 18 years with a diagnosis of IMANEST who were admitted and agreed to undergo percutaneous coronary intervention procedures during hospitalisation, having complete clinical data and supporting examinations in the medical record. Patients who underwent previous coronary artery bypass surgery and patients with incomplete medical data were excluded from the study.

The sample in this study were patients diagnosed as acute coronary syndrome without ST segment elevation. IMANEST includes acute myocardial infarction without ST segment elevation and unstable angina pectoris. The diagnosis of IMANEST was based on ESC criteria in 2020 and PERKI guidelines in 2018. Researchers examined patient data during treatment in medical records to obtain data on patient profiles, risk

factors, ECG examinations, and laboratory examinations. ECG examination was performed using a Bionet Cardiotouch 3000 device, a speed of 25 mm/s and an amplitude scale of 10 mV/mm when the patient entered the ER. Laboratory examination was carried out when the patient entered the emergency room through the Clinical Pathology Laboratory of the RSUP. Haji Adam Malik Medan.

Patients who met the inclusion and exclusion criteria were then assessed against the risk stratification score, namely the PURSUIT score. Patients with acute coronary syndrome will undergo coronary angiography to assess coronary artery lesions in the catheterisation laboratory of Adam Malik Hospital Medan. SYNTAX score calculation Severity of coronary artery lesions will be assessed using SYNTAX score using the application at http://www.syntaxscore.com/calculator/start.htm. SYNTAX score will be validated by 2 cardiology specialists. All data will be analysed using statistical tests. The data obtained from this observation will then be subjected to statistical analysis using a statistical programme to test the research hypothesis and achieve the objectives of the study.

For the assessment of hypothesis testing to assess whether there is a relationship between PURSUIT score and SYNTAX score values obtained from coronary angiography in patients with acute myocardial infarction using Pearson correlation test for normally distributed numerical data or Spearman Correlation test for non-normally distributed data. It is said that the relationship between the two variables will be statistically significant if the p value is less than equal to 0.05. If the relationship between the variables PURSUIT score and SYNTAX score has been obtained, proceed to test the strength of the relationship between the two variables expressed by the correlation coefficient (r).

RESULT

Demographic Characteristics of Research Subjects

This study followed 70 IMANEST patients who underwent coronary angiography at H. Adam Malik Hospital Medan. All patients met the inclusion and exclusion criteria and were included in the study. All subjects were recorded data in the form of anthropometric indices, risk factors, basic ECG rhythm, laboratory results, and coronary angiography results. Laboratory results included complete blood tests, renal function, glucose levels, lipid profile, blood glucose profile, and cardiac enzymes.

Of the 70 research subjects, the mean age of the subjects was 56 years old and dominated by male gender, totalling 50 people (71.4%). Risk factors such as hypertension, smoking, and diabetes mellitus were sequentially found in 51 people (72.9%), 34 people (48.6%), 40 people (57.1%). There were 20 people (28.6%) diagnosed with both acute and chronic heart failure.

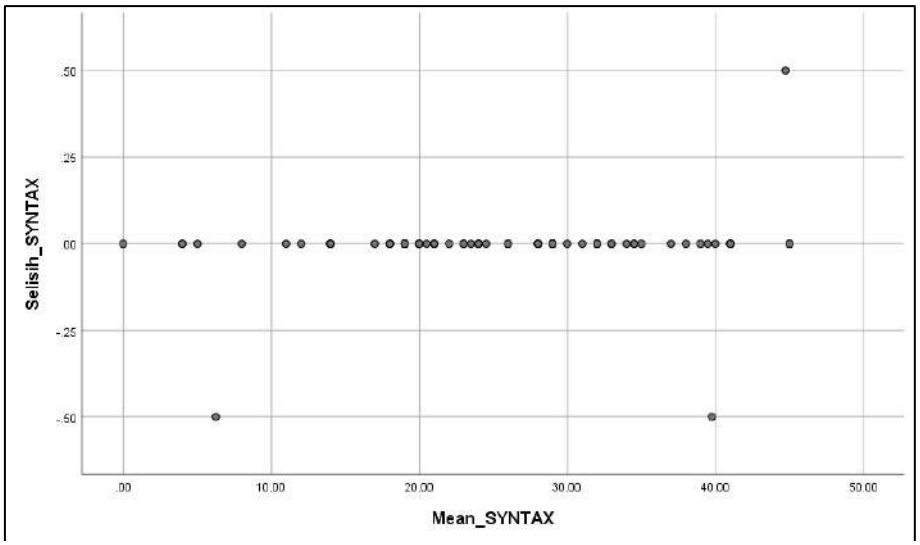

Figure 1. Bland-Altman graph of SYNTAX scores in the intraobserver reliability test

Characteristics of Study Subjects Based on Coronary Lesion Severity

The group of patients with SYNTAX score ≥ 23 significantly had risk factors for Type 2 DM (p=0.046), with coronary angiography results of multivessel disease (p<0.001). The group of patients with SYNTAX score ≥ 23 tended to have higher LDL-C values (p=0.029), higher HbA1C (p=0.013), higher fasting blood sugar levels (p=0.009), higher intermittent blood sugar levels (0.029) than the group of patients with SYNTAX score < 23.

PURSUIT and SYNTAX Score in IMANEST Patients

The mean PURSUIT score was 11.0 + 3.31, while the mean SYNTAX score was 25.6 + 10.8

The Association of PURSUIT Score to Coronary Lesion Severity

The results of the analysis using the Pearson correlation test show that there is a significant correlation between the PURSUIT score and the SYNTAX score (p < 0.05). The correlation value obtained is 0.258. Based on the correlation value, it is known that there is a positive correlation between the PURSUIT score and the SYNTAX score with a low level of strength (r value> 0.2 - 0.4). The higher the PURSUIT score will be followed by an increase in the SYNTAX score.

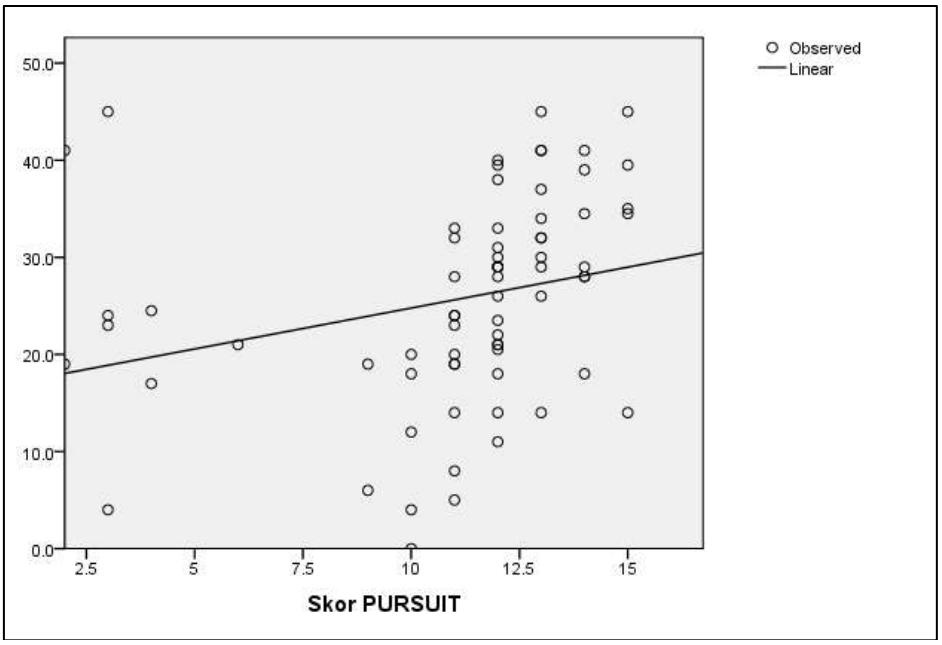

Figure 2. Scatterplot Graph of Correlation of PURSUIT Score and SYNTAX Score in IMANEST Patients

Accuracy of PURSUIT Score in Predicting SYNTAX Score

The results of the analysis using the ROC curve (Figure 4.3) obtained the AUC area of the SYNTAX Score in predicting the complexity of severe and intermediate angiography in IMANEST patients was 75.6% with a p value of 0.001 with 95% IK 60% - 84%. It can be concluded that the PURSUIT score can be used to predict the complexity of coronary angiography in IMANEST patients with a moderate level of ability (AUC> 70%).

Based on the table in Figure 4.4, the cut off value of the PURSUIT Score to predict angiographic complexity in IMANEST patients is 11.5 with a sensitivity of 75.6% and specificity of 62.1%.

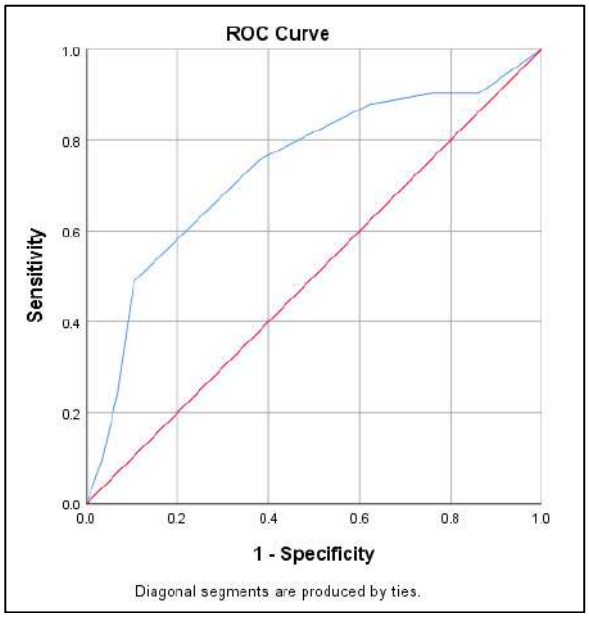

Figure 4.3. ROC Curve of PURSUIT Score against SYNTAX Score

DISCUSSION

Cardiovascular disease is still the leading cause of death in the world.1 Coronary heart disease is a pathological process characterised by the accumulation of atherosclerotic plaque in epicardial arteries, both obstructive and non-obstructive, of which one subset is IMANEST.[4]

This study is a cross-sectional study to determine the relationship of PURSUIT score to the severity of coronary lesions in IMANEST patients at Hajj Adam Malik Hospital. Data collection was carried out at RSUP H Adam Malik Medan since December 2021 involving 70 research subjects. The research subjects were IMANEST patients at HAM Hospital who fulfilled the inclusion and exclusion criteria, where laboratory examinations and coronary angiography examinations were carried out. After the examination, the patient's SYNTAX score was calculated.

Common risk assessment scores for assigning risk in patients with IMA-NEST include TIMI (Thrombolysis In Myocardial Infarction) risk score, PURSUIT (Platelet Glycoprotein IIb/IIIa in Unstable Angina: Receptor Suppression Using Integrilin Therapy) risk score, GRACE (Global Registry of Acute Coronary Events) risk score, and NCDR-ACTION (National Cardiovascular Data Registry-Acute Coronary Treatment and Intervention Outcomes Network) registry.

Assessment of platelet glycoprotein IIb/IIIa score in unstable angina: receptor suppression using integrilin therapy (PURSUIT) using age (within a decade), gender, class of symptoms in the last 6 weeks, presence of heart failure symptoms, and ST depression on ECG. In the PURSUIT trial, 12% of patients with a previous history of coronary artery bypass grafting (BPAK) and worse follow-up outcomes, including increased mortality, but the benefit of eptifibatide treatment was similar to patients without a history of BPAK. Patients with a history of previous BPAK are more likely to undergo early catheterisation after NSTEMI.

The PURSUIT and GRACE scores showed good discriminatory accuracy to predict death and incidence of recurrent myocardial infarction as a composite endpoint at 30 days and 1 year. The mean values in this population were 13 (range: 1-19) for the PURSUIT Score, 4 (range: 1-7) for the TIMI Score, and 122 (range: 50-237) for the GRACE Score. The proportion of patients who obtained a clear benefit from myocardial revascularisation during initial hospital admission, in this multivariable analysis model, was only 28.7% for the PURSUIT Score and 36.7% for the GRACE score.[10]

The score with the highest OR, indicating a high risk of developing coronary heart disease, was the PURSUIT Score (OR=0.80; 95% CI=0.74-0.85). The corresponding values for LR-, NPV, miss rate, and proportion of patients classified as low risk according to PURSUIT score were 0.51, 80%, 20%, 44.6%, respectively. In line with this study, where the results of the analysis using the ROC curve obtained the AUC

area of the SYNTAX Score in predicting angiographic complexity of severe and intermediate degrees in IMANEST patients was 75.6% with a p value of 0.001 with 95% IK 60% - 84%. The syntax score (SS), which is an angiographic method used in assessing the complexity of SCA, is graded according to coronary anatomy and coronary lesion characteristics.38 Based on the number of scores, an SS Score < 22 is considered low risk, while a score > 22 is considered medium - high risk.39 On ROC curve analysis, SS II PCI >33.1 had a sensitivity of 68.2% and specificity of 54.6% [AUC=0.624, P=0.01, 95% CI (0.536-0.707)] while SS II CABG >26.1 had a sensitivity of 81.8% and specificity of 54.6% [AUC=0.670, P<0.01, 95% CI (0.583-0.749)] for predicting carotid artery stenosis.

After analysis with the Pearson correlation statistical test in this study, the correlation between the PURSUIT score and the severity of coronary lesions based on the SYNTAX score was obtained with a correlation value (r) of 0.258 ($p < 0.001$). Although this correlation is relatively weak, it is quite in line with the results of the research study by Khandelwal, et al. Where the results obtained that the PURSUIT risk score has a weak/medium correlation with the severity of coronary angiography. In this study, the correlation value (r) was 0, 274, a result that is almost the same as this study. While another study by Boersma, et al. in 2000 on 9,461 patients with UAP and IMANEST with RCT (Randomised Controlled Trial) method obtained quite different results. In this study, a statistical test of mulitipel regression was carried out on several parameters, namely: age, heart rate, systolic blood pressure, presence of ST depression, signs of heart failure, and elevated cardiac enzymes. It was found that the PURSUIT score obtained a C-statistic of 0.814 for predicting mortality, which means that it has a strong enough ability to predict mortality, even though it only produces a C-statistic of 0.669 for predicting disease.[11]

CONCLUSION

PURSUIT score has a positive correlation relationship in predicting coronary angiography complexity in IMANEST patients with a low level of strength.

DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara and Haji Adam Malik General Hospital.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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COMPETING INTERESTS

The authors declare that there is no conflict of interest.

AUTHORS' CONTRIBUTIONS

All authors significantly contribute to the work reported, whether in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas. Contribute to drafting, revising, or critically reviewing the article. Approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

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