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Original article

The Relationship between H2FPEF and SYNTAX Scores in Patients with Acute Coronary Syndrome

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Abstract

Background: Acute coronary syndrome (ACS) encompasses unstable angina and myocardial infarctions (MI), both ST-elevation (STEMI) and non-ST-elevation (NSTEMI). This study aimed to evaluate the severity of coronary artery disease (CAD) in ACS patients by comparing the H2FPEF score with the SYNTAX score. **Methods:** This prospective observational study included one hundred patients with ACS who underwent coronary angiography within two days of hospital admission. Based on SYNTAX score, patients were categorized into two groups: Group I (SYNTAX $\leq$ 22) and Group II (SYNTAX > 22). Echocardiographic and clinical data were collected and analyzed. **Results:** Group II patients showed significantly lower mean LVEF and TAPSE ($p < 0.001$) and higher E/e′ ratio and PASP ($p < 0.05$). Patients with major adverse cardiovascular and cerebrovascular events (MACCE) had notably higher mean H2FPEF scores than those without events. A strong correlation was found between higher H2FPEF and SYNTAX scores, indicating that H2FPEF can serve as a predictive marker for CAD severity and short-term outcomes. **Conclusion:** The H2FPEF score is a simple and effective tool for assessing CAD severity and short-term prognosis in ACS patients. Scores $\geq$2 are significantly associated with higher SYNTAX scores and increased risk of MACCE at 30-day follow-up, suggesting its utility in early risk stratification.

Keywords: H2FPEF; SYNTAX scores; Acute Coronary Syndrome.

Introduction

The terms "acute coronary syndrome" (ACS) and "myocardial infarction" (MI) fall along a spectrum that includes unstable angina, MI that does not include ST elevation, and MI that does involve ST elevation. [1].

Acute coronary syndrome (ACS) is most common when coronary arteries abruptly narrow or block blood flow to the heart, depriving the heart tissues of oxygen. There are two types of blockages: complete (STEMI with some NSTEMI) and partial (NSTEMI alone). [2].

When atherosclerotic plaque ruptures or erodes, it causes coronary artery blockage, which in turn causes the production of intraluminal thrombus in one or more coronary arteries.[1].

Various coronary revascularization methods, including hybrid revascularization (HCR), percutaneous coronary intervention (PCI), and coronary artery bypass grafting (CABG), have shown promise in the treatment of acute coronary syndrome. [3].

The requirement for risk stratification and prognostic assessments, together with the increasing annual patient treatment volume for coronary artery disease (CAD), has led to the development of several approaches for assessing patients' risk and predicting their outcome after therapeutic intervention. When considering the most significant scoring systems now in use, the SYNTAX score is right up there.[4].

To determine the extent of coronary artery lesions, cardiologists, interventionists, and surgeons may use angiographic metrics such the SYNTAX score. In patients receiving modern revascularization, particularly percutaneous coronary intervention (PCI), a higher SYNTAX score depicts a more complicated disease and a worse prognosis.[5].

When the heart is unable to pump enough blood to keep the blood pressure and oxygen levels in the blood where they ought to be, this condition is known as heart failure (HF). A common medical disease, heart failure, may be expensive and even deadly. More than forty million individuals throughout the world were impacted in 2015. [6].

An alarmingly high number of deaths and hospitalizations are associated with heart failure (HF), a complicated illness. Myocardial tissue and contractile function are lost in ischemic heart disease (IHD), a leading cause of HF. [7].

There may not be a causal association between CAD and HFpEF in many individuals, because the two conditions share similar risk factors such as hypertension and age. The optimal method of diagnosing coronary artery disease (CAD) in patients who present with heart failure with preserved ejection fraction (HFpEF), the most effective method of treating CAD in the absence of a sudden cardiac event, and whether

CAD patients should be classified differently from non-CAD patients are all areas where information is lacking. [(8).]

Researchers in this research aimed to learn more about the kind and degree of CAD in patients with ACS by comparing the H2FPEF score to the SYNTAX score.

Patients and methods

Patients:

Benha University Hospital conducted single prospective observational research between April 2023 and April 2025. A total of one hundred patients admitted to the hospital with acute coronary syndrome had coronary angiography done no later than two days after their admission.

Patients' signed informed permission was carefully obtained. Following approval by the study's Ethics Committee, the research was conducted out at Benha University's Faculty of Medicine.

Inclusion criteria were patients diagnosed with acute coronary syndrome by coronary angiography. Acute coronary syndrome (ACS) includes angina pectoris, myocardial infarction (MI) that is not ST-elevation and MI that is ST-elevation.

Exclusion criteria were persons who have had a history of cancer, heart failure (both systolic and diastolic), severe valve disease, preprocedural resuscitation, are under the age of 18, are pregnant, or have had previous PCI, coronary artery bypass graft surgery, severe heart failure, or cancer.

Grouping: Patients were divided into two groups according to severity of CAD: **Group I:** 65 patients with low syntax score ≤ 22. **Group II:** 35 patients with intermediate / high syntax score > 22.

Methods:

All studied cases were subjected to the following: Detailed history taking, including [Fill out the patient's information correctly, paying special attention to their name, gender, age, and medical history. Diabetes, high blood pressure, smoking, excess body fat, and a personal or family history of dyslipidaemia or early coronary artery disease are some of the factors that might increase your risk.].

Full clinical examination: Verifying the patient's vitals, such as temperature, respiration rate, blood pressure, and heart rate Comprehensive cardiac evaluation performed in-person, including the Killip test.

Investigations: ECG, Laboratory examinations [complete blood count, blood sugar, serum creatinine, urea, lipid profile, cardiac enzymes, aspartate aminotransferase (AST), alanine aminotransferase (ALT)].

Hypertension (HTN) This group includes those who are either medicated to keep their blood pressure in check or whose diastolic values are 140/90 mm Hg or above.[9] **Diabetes mellitus (DM)** Having high blood sugar levels (fasting blood glucose > 126 mg/dl (7mmol/l), random blood glucose > 200 mg/dl (11.1mmol/l)), an excessive thirstiness, unexplained weight loss, a hemoglobin A1C of 6.5% (≥ 48mmol/mol), and a history of diabetes treatment with oral hypoglycemic drugs or insulin were all criteria for diabetes in patients. [10]

ECG: Following the 2017 ESC recommendations, all hospitalized patients were given a conventional 12-lead electrocardiogram (ECG) within 10 minutes after their first medical contact (FMC). For diagnosing right ventricular infarction and issues with the posterior wall, a few individuals had right pericardial leads (V3R, V4R, V5R, and V6R) in addition to posterior chest leads (V7 to V9).

2D echocardiography: While lying on their left sides in the lateral decubitus position, subjects were investigated using an ultrasonic device Philips Epic 7 with a 5.5 X transducer. The echocardiographic evaluation was conducted by either our laboratory or the emergency department's observation unit.

Assessment of LV systolic function: by modified Simpson method (((LVEDV – LVESV) / LVEDV) * 100).

Assessment of LV diastolic dysfunction: Apical 4-chamber pulsed wave Doppler was used to determine peak (E), late (A), deceleration (T), and the E/A ratio across the mitral valve.

Tissue Doppler imaging (TDI) vital signs were recorded. The myocardium's early diastolic (E') and late diastolic (A') velocities were evaluated after implanting a pulsed sample volume in the septal and lateral mitral annulus corners. Next, we determined the E/E′ ratio.

Left ventricular diastolic dysfunction used E/A and E/e' ratios to make a diagnosis in accordance with the most recent recommendations.

Assessment of RV function: The tricuspid annular plane systolic excursion (TAPSE) was calculated by placing an M-mode cursor on the lateral tricuspid annulus in the standard apical 4-chamber image at peak systole, which allows us to assess the annulus's longitudinal motion.

We used the RV inflow, apical four-chamber, and subcostal viewpoints to evaluate RVSP with TR. By applying the modified Bernoulli equation to the view with the greatest tricuspid jet velocity, RVSP was obtained. Every single patient had the right atrial pressure goal of 10 mmHg.

H2FPEF score:

Three viewpoints were used to assess RVSP with TR: the RV inflow, the apical four-chamber, and the subcostal. To get RVSP, the modified Bernoulli equation was applied using the view with the greatest tricuspid jet velocity. All patients were instructed to maintain a right atrial pressure of 10 mmHg.

Coronary angiography: One hundred patients had femoral approach cardiac catheterization. Traditional cardiac angiography techniques were used to get pictures. Unbeknownst to them, the trial was underway while two interventional cardiologists assessed the degree of coronary artery disease using the SYNTAX score.

The infarct was found to be associated with an artery. The angiographic data (target vessel, lesion characteristics) and the infarct site on the admission ECG were used by an interventional cardiologist to identify the causative lesion {Heitner, 2019 #133}.

Quick procedures were conducted utilizing a 6-Fr guiding catheter, including percutaneous coronary intervention (PCI) with or without stenting. Both before and during thrombus aspiration, the balloon was inflated as instructed. It was up to the operator to decide which stents to use.

Whether a reperfusion was successful (TIMI 3) or abnormal (TIMI 0-1-2), as stated by El Sayed (2025 #134), was determined using the TIMI blood flow grade.

Approval code: MS 24-3-2023

Statistical analysis

Our statistical analysis was conducted using SPSS v28, a software developed and maintained by IBM Inc. of Armonk, NY, USA. Using standard deviations and means as well as an unpaired Student’s T-test, we compared the two sets of data. For suitable data evaluation, we employed Chi-square and Fisher's exact tests. For qualitative variables, we provided both the frequency and percentage (%). The time interval before the occurrence of MACE was shown using a Kaplan-Meier curve. Researchers determined the strength of the relationship between two numerical variables using the Pearson or Spearman correlation. Furthermore, logistic regression was used to assess the connection between a dependent variable and one or more independent variables, whether they were multivariate or univariate. For statistical purposes, a two-tailed P value less than 0.05 was deemed significant.

Results

The age and sex differences between the two groups were not statistically significant, although the group II patients had a higher BMI than the group I patients ($P<0.001$). (The p-value is less than 0.05) Patients in group II were more likely to have dyslipidemia and a background of coronary artery disease. Atrial fibrillation (AF) was also less common in group I compared to group II, with a p-value of less than 0.001.

Additional risk variables, including a family history of hypertension, diabetes mellitus, smoking, congestive heart failure (CHF), or coronary artery disease (CAD), were not significantly different between the two groups. The types of ACS were significantly different between the two groups; individuals in Group II were more likely to have STEMI. Heart attacks without ST-elevation and unstable angina were more common in patients in group I. **Table 1**

There was no statistically significant difference (P = 0.071) in Killip class between the two datasets. When comparing group, I to group II, the test results showed that group II had lower HDL-C levels and higher total cholesterol, triglycerides, and LDL-C levels (P value < 0.001). The frequency of positive troponin and CKMB results was significantly greater in patients belonging to group II (P value <0.05). There was no significant difference in the serum creatinine levels of the two groups. **Table 2**

To predict a high SYNTAX score in patients with acute coronary syndrome (ACS) who had coronary angioplasty within two days of hospital admission, a receiver operating characteristic (ROC) curve was used to evaluate diagnostic values, or overall accuracy. The H2F2PEF score has a sensitivity of 71.43% and a specificity of 95.38%, and it may predict intermediate to elevated risk at a threshold value of >2 (P<0.001), with an area under the curve (AUC) of 0.958. There was an additional finding of 94.12 sensitivity, 77.27 specificity, and 0.849 total area under the curve (AUC) when the LVEF cutoff values were below 57. **Figure 1**

A significantly higher average H2F2PEF score was seen in group II patients compared to group I patients (P value <0.001). There was no statistically significant difference between the two groups for the kind of MACE; however, following 30 days of follow-up, Group II had a significantly greater incidence of MACE (9 patients, P = 0.028). **Table 3**

The univariate logistic regression technique found that age, body mass index (BMI), hypertension, diabetes mellitus, atrial fibrillation, left ventricular ejection fraction (LVEF), transaminase, serum phosphoprotein, and H2F2PEF score were significant predictors of CAD severity. Finally, in the multivariate logistic regression analysis, the only variables that significantly predicted a high SYNTAX score among patients with ACS who had coronary angiography within two days of admission were the H2F2PEF score and LVEF.**Table 4**

A decreased mean LVEF and TAPSE were seen in group II patients according to the echocardiographic results (P value < 0.001). Patients in group II had noticeably greater mean E/è ratios and mean PASPs, as shown by a p-value less than 0.05. There was no discernible change in the E/A ratio between the two data sets.

Patients with MACCE had a much higher mean H2F2PEF score than non-MACCE patients, suggesting that this score could be useful for predicting the short-term prognosis of patients with ACS. **Table 5**

Table 1: Baseline characteristics, risk factor and type of ACS of the studied groups

		Group I (n=65)	Group II (n=35)	P value
Age (years)		55.7 ± 10.38	58.8 ± 11.08	0.160
Sex	Male	18 (27.69%)	8 (22.86%)	0.599
	Female	47 (72.31%)	27 (77.14%)	
BMI (Kg/m^2)		27.23 ± 1.71	30.03 ± 5.34	<0.001*
Risk factors				
DM		23 (35.38%)	15 (42.86%)	0.463
HTN		39 (60%)	23 (65.71%)	0.574
Dyslipidemia		32 (49.23%)	29 (82.86%)	0.001*
Smoking		23 (35.38%)	13 (37.14%)	0.861
History of CHF		2 (3.08%)	4 (11.43%)	0.180
History of CAD		11 (16.92%)	15 (42.86%)	0.005*
Family history of CAD		5 (7.69%)	7 (20%)	0.071
AF		1 (1.54%)	8 (22.86%)	<0.001*
Type of ACS				
STEMI		28 (43.08%)	24 (68.57%)	0.033*
NSTEMI		24 (36.92%)	9 (25.71%)	
UA		13 (20%)	2 (5.71%)	

BMI: body mass index, DM: diabetes mellitus, HTN: hypertension, CHF: congestive heart failure, CAD: coronary artery disease, AF: atrial fibrillation, ACS: acute coronary syndrome, STEMI: ST segment elevation myocardial infarction, NSTEMI: non-ST segment elevation myocardial infarction, UA: instable angina, *: statistically significant as P value ≤0.05

Table 2: Baseline Killip class and Laboratory investigations of the studied groups

		Group I (n=65)	Group II (n=35)	P value
Killip class	Class 1	60 (92.31%)	28 (80%)	0.071
	Class 2	5 (7.69%)	7 (20%)	
Laboratory investigations		**Syntax score ≤ 22 (n=65)**	**Syntax score > 22 (n=35)**	**P value**
Serum creatinine (mg/dL)		0.95 ± 0.24	0.91 ± 0.19	0.422
Total cholesterol (mg/dL)		189 ± 25.42	218.7 ± 25.7	<0.001*
Triglycerides (mg/dL)		155.02 ± 28.59	174.1 ± 46.5	0.012*
LDL-C (mg/dL)		134.6 ± 21.01	161.4 ± 24.11	<0.001*
HDL-C (mg/dL)		49.6 ± 7	42.9 ± 4.17	<0.001*
Troponin	Positive	50 (76.92%)	33 (94.29%)	0.029*
	Negative	15 (23.08%)	2 (5.71%)	
CK-MB	Positive	48 (73.85%)	34 (97.14%)	0.003*
	Negative	17 (26.15%)	1 (2.86%)	

LDL-C: low-density lipoprotein cholesterol, HDL-C: high-density lipoprotein cholesterol, CK-MB: Creatine kinase- myoglobin binding, *: statistically significant as P value ≤0.05.

Table 3: Echocardiography, risk scores and prognosis of the studied group

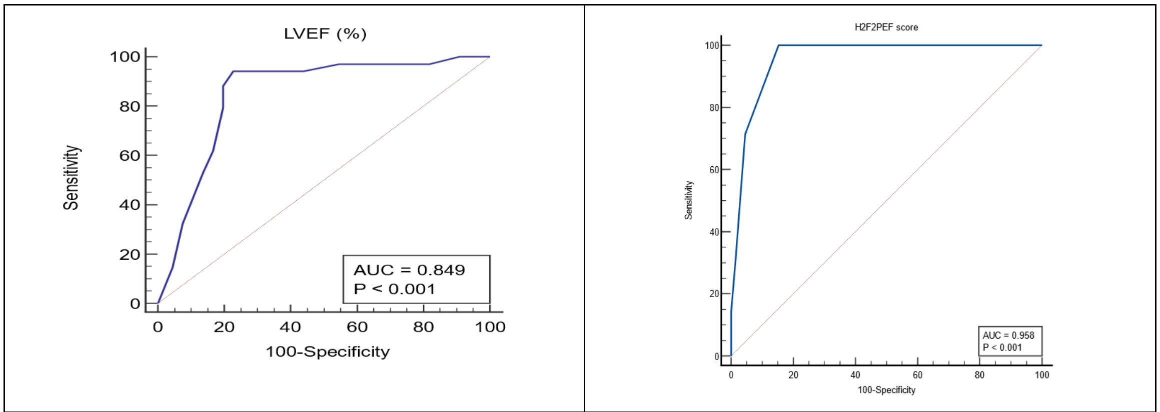
	Group I (n=65)	Group II (n=35)	P value
LVEF (%)	60.6 ± 5.36	53.4 ± 3.26	<0.001*
E/A ratio	0.98 ± 0.22	0.97 ± 0.29	0.807
E/e`ratio	6.3 ± 0.76	7.2 ± 0.72	0.012*
TAPSE (mm)	21.3 ± 1.83	19.5 ± 1.29	<0.001*
SPAP (mmHg)	27.3 ± 3.46	28.9 ± 4.59	0.050*
H2F2PEF score	0.78 ± 0.86	2.9 ± 1.3	<0.001*
Prognosis			
MACE	6 (9.23%)	9 (25.71%)	0.028*
Type of MACE			
CV death	0 (0%)	2 (13.33%)	0.056
Non-fatal MI	2 (3.08%)	2 (13.33%)	
Non-fatal stroke	0 (0%)	3 (20%)	
Repeat revascularization	1 (1.54%)	1 (6.67%)	
Rehospitalization for HF	3 (4.62%)	1 (6.67%)	

LVEF: left ventricular ejection fraction, E/A: early to atrial filling velocity ratio, E/e': early mitral inflow velocity to early diastolic mitral annulus velocity ratio, TAPSE: tricuspid annular plane systolic excursion, SPAP: systolic pulmonary artery pressure, MACE: major adverse cardiovascular events, CV: cardiovascular, MI: myocardial infarction, HF: heart failure, *: statistically significant as P value ≤0.05.

Table 4: Univariate and multivariate logistic regression analysis for prediction of high SYNTAX score.

	Univariate			Multivariate		
	OR	**95% CI**	**P value**	**OR**	**95% CI**	**P value**
Age (years)	1.0502	1.0068 to 1.0955	**0.007***	1.0247	0.9250 to 1.1353	0.640
BMI (Kg/m^2)	1.3282	1.1115 to 1.5870	**0.001***	1.1801	0.8778 to 1.5866	0.273
HTN	1.2778	0.5427 to 3.0087	**0.026***	0.9265	0.7225 to 1.1881	0.547
DM	1.3696	0.5909 to 3.1745	**0.006***	0.0816	0.0056 to 1.1870	0.067
AF	18.9630	2.260 to 159.09	**<0.001***	0.0368	0.0003 to 4.2998	0.174
LVEF (%)	0.7183	0.6327 to 0.8154	**<0.001***	0.0025	0.0000 to 0.1394	**0.030***
TAPSE (mm)	0.4276	0.2932 to 0.6235	**<0.001***	0.4807	0.2189 to 1.0554	0.068
SPAP (mmHg)	1.1145	0.9941 to 1.2495	**0.027***	1.1231	0.9085 to 1.3884	0.283
H2F2PEF score	5.3860	2.8028 to 10.349	**<0.001***	0.2490	0.0777 to 0.7977	**0.002***

LVEF: left ventricular ejection fraction**, TAPSE:** tricuspid annular plane systolic excursion, **SPAP:** systolic pulmonary artery pressure, OR: odds ratio, CI: confidence interval, ***:** statistically significant as P value <0.05.



(A) (B)

Figure 1: ROC curve analysis of (A) LVEF for prediction of high SYNTAX score and (B) H2F2PEF score for prediction of high SYNTAX score.

Table 5: Correlation between H2F2PEF score and other parameters.

	H2F2PEF score	
	R	**P**
Age (years)	0.383	<0.001*
Sex	0.310	0.002*
BMI (Kg/m^2)	0.312	0.002*
DM	0.176	0.080
HTN	0.486	<0.001*
Dyslipidemia	0.262	0.009*
Smoking	-0.185	0.065
History of CHF	0.320	0.001*
History of CAD	0.262	0.008*
AF	0.667	<0.001*
ACS type	0.050	0.620
Total cholesterol (mg/dL)	0.086	0.396
Triglycerides (mg/dL)	0.133	0.186
LDL-C (mg/dL)	0.404	<0.001*
HDL-C (mg/dL)	-0.265	0.008*
Troponin	0.034	0.735
CK-MB	0.097	0.335
LVEF (%)	-0.543	<0.001*
E/A ratio	0.010	0.921
E/e` ratio	0.473	<0.001*
TAPSE (mm)	-0.437	<0.001*
SPAP (mmHg)	0.021	0.837
ECG ischemic changes	0.139	0.169
SYNTAX score	0.698	<0.001*
MACE	0.278	0.005*

BMI: body mass index, DM: diabetes mellitus, HTN: hypertension, CHF: congestive heart failure, CAD: coronary artery disease, AF: atrial fibrillation, ACS: acute coronary syndrome, LDL-C: low-density lipoprotein cholesterol, HDL-C: high-density lipoprotein cholesterol, CK-MB: Creatine kinase- myoglobin binding, LVEF: left ventricular ejection fraction, E/A: early to atrial filling velocity ratio, E/e': early mitral inflow velocity to early diastolic mitral annulus velocity ratio, ECG: electrocardiogram, MACE: major adverse cardiovascular events, r: correlation coefficient, ***:** statistically significant as P value ≤0.05.

Discussion

Many different medical issues may be included under the umbrella term "acute coronary syndrome" (ACS). This includes unstable angina as well as ST-elevation and non-ST-elevation myocardial infarctions. When coronary blood flow is either completely reduced (in STEMI and certain NSTEMI cases) or partially blocked (in NSTEMI cases only), the heart muscle does not get as much oxygen. Thrombi develop inside one or more coronary arteries as a typical consequence of atherosclerotic plaque rupture or erosion, leading to coronary artery blockage.

A higher body mass index (BMI) was seen in those with high syntactic scores (p value < 0.05) in the present research.

This finding was supported by research conducted by Zhang et al., who showed that those with a high BMI had a much higher odd ratio of high syntactic score than those with a low BMI (p value < 0.05). the fourteenth. These findings ran counter to what Xu et al. discovered, who discovered that the groups they examined did not differ significantly in terms of body mass index (p = 0.563). Xu M et al., [13].

People with higher syntactic scores were more likely to have AF (p value < 0.001) in our study.

According to Bayam et al. (p value < 0.05), patients who scored higher on the syntax test were much more likely to have AF. Bayam E et al., [15].

The frequency of STMEI across the several forms of ACS studied in our research was significantly greater in patients with higher syntax scores (p value < 0.05).

Findings by Minamisawa et al. corroborate this, since they, too, found that STEMI patients were more common among individuals with higher SYNTAX scores than lower ones (p = 0.002). Minamisawa et al., [16].

The presence of ECG anomalies and Killip class did not vary across the groups evaluated in this research (p > 0.05).

According to Hammami et al., there was no significant difference in the frequency of ST segment depression or Killip class between patients with high and poor syntax scores (p > 0.05). Our findings are consistent with theirs. Hammami R et al., [11].

According to our research, those who scored higher on the syntactic test had considerably greater amounts of total cholesterol, triglycerides, and LDL, and lower amounts of HDL (P<0.05).

This study confirmed the findings of other studies showing a significant association between syntax score and total and LDL cholesterol and a negative correlation between HDL and syntax score. Lin T et al., [17].

Positive troponin and CK-MB results were more common in patients with a high syntactic score ($P<0.05$) in this investigation.

The findings of Ho and Tran corroborate our own, showing that low syntactic scores were associated with a lower mean serum troponin level than intermediate/elevated risk scores ($p= 0.011$). Ho AB et al., [18].

Patients with a high syntax score were shown to have lower EF% and TAPSE, a greater E/ E/e` ratio, and PASP ($P<0.05$) in the current research.

Consistent with previous research, our findings showed that a lower EF% was associated with an improved syntax score (p value= 0.03, and 0.002, respectively), as did Bayam et al. and Mishra et al [19]. Mishra et al. [19] found that better syntax scores were strongly linked with higher DD grades ($p=0.0009$) Mishra S et al., [19. In a similar vein, Mansour et al. discovered a syntactic score–E/e ratio association that was statistically significant ($p=0.001$). Mansour H et al., [20].

Our research found that patients with better syntactic test scores also had a higher median H2F2PEF score (p value< 0.001).

In agreement with our findings, Bayam et al. also found a favorable association ($r=0.694$, p value<0.001) between H2F2PEF and SYNTAX scores. Bayam E et al., [15].

Higher syntactic test scores were associated with a higher median H2F2PEF score (p value< 0.001) in our research.

Consistent with our findings, Bayam et al. also found a significant connection ($r=0.694$, p value<0.001) between H2F2PEF and SYNTAX scores. Türkoğlu C et al., [21].

The findings of this research demonstrate that the H2F2PEF score is the most effective diagnostic tool for assessing the severity of coronary artery disease. It has a sensitivity of 71.43%, specificity of 95.38%, and a p value less than 0.001. Two is the minimum acceptable value.

This lends credence to the discovery made by Bayam et al. that a high SYNTAX score was predicted by an H2F2PEF score beyond a 2.5 cut-off level (specificity: 82.5%, sensitivity: 80%, p-value: <0.001).[15, 22]. An independent predictor of coronary slow flow phenomenon was identified by Turkoglu et al. as an H2F2PEF cut-off value greater than two. A p-value of less than 0.001 accompanied its 79% sensitivity and 77% specificity. Türkoğlu et al., [21].

Our findings align with those of Bayam et al., who demonstrated that an H2F2PEF score of 2 or higher (p value <0.00) may be used to identify individuals with atherosclerosis. Bayam et al.,[15].

People who had MACE had a higher mean H2F2PEF score than those who did not (p value <0.001).

Patients with higher H2F2PEF scores were more likely to have HF-related events throughout the follow-up period compared to those with lower or intermediate scores, as shown by this study's findings (P value < 0.001). Suzuki et al., [23].

According to Sun et al., patients with higher H2F2PEF scores had a greater likelihood of dying and requiring hospital readmission compared to those with intermediate or low scores (p value < 0.05). Sun et al., [24].

The study does have some limitations. The findings may not be applicable to the broader population since the research only covered 100 participants. Due to the study's limited scope, its results may not apply to a broader population. The 30-day follow-up period may not have shown any long-term prognostic consequences.

Conclusion:

Patients with ACS may have their H2F2PEF scores evaluated readily; these scores can show how severe their CAD is and provide data for risk stratification predictions. Intermediate to high syntax scores and short-term MACE were more likely to be related with higher mean H2F2PEF scores (30-day follow-up). To accurately identify the severity of CAD in patients with ACS, the most reliable diagnostic sign was an H2F2PEF score cutoff value of 2 or above.

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References:

1. Keykhaei M, Ashraf H, Rashedi S, Farrokhpour H, Heidari B, Zokaei S, et al. Differences in the 2020 ESC Versus 2015 ESC and 2014 ACC/AHA Guidelines on the Management of Acute Coronary Syndromes in Patients Presenting Without Persistent ST-Segment Elevation. Curr Atheroscler Rep. 2021;23:77.
2. Abusharekh M, Kampf J, Dykun I, Souri K, Backmann V, Al-Rashid F, et al. Acute coronary occlusion with vs. without ST elevation: impact on procedural outcomes and long-term all-cause mortality. Eur Heart J Qual Care Clin Outcomes. 2024;10:402-10.
3. Bigler MR, Kadner A, Räber L, Ashraf A, Windecker S, Siepe M, et al. Therapeutic management of anomalous coronary arteries originating from the opposite sinus of Valsalva: current evidence, proposed approach, and the unknowing. Journal of the American Heart Association. 2022;11:e027098.
4. Gurm HS, Seth M, Kooiman J, Share D. A novel tool for reliable and accurate prediction of renal complications in patients undergoing percutaneous coronary intervention. Journal of the American College of Cardiology. 2013;61:2242-8.
5. Li M, Liu X, Jiang M, Lei Y, Li Z, Li S, et al. Prognostic Capability of Clinical SYNTAX Score in Patients with Complex Coronary Artery Disease and Chronic Renal

Insufficiency Undergoing Percutaneous Coronary Intervention. Rev Cardiovasc Med. 2024;25:18.

6. Ma C, Luo H, Fan L, Liu X, Gao C. Heart failure with preserved ejection fraction: an update on pathophysiology, diagnosis, treatment, and prognosis. Braz J Med Biol Res. 2020;53:e9646.
7. Severino P, D'Amato A, Pucci M, Infusino F, Birtolo LI, Mariani MV, et al. Ischemic Heart Disease and Heart Failure: Role of Coronary Ion Channels. Int J Mol Sci. 2020;21.
8. Owan TE, Hodge DO, Herges RM, Jacobsen SJ, Roger VL, Redfield MM. Trends in prevalence and outcome of heart failure with preserved ejection fraction. N Engl J Med. 2006;355:251-9.
9. Head GA, Mihailidou AS, Duggan KA, Beilin LJ, Berry N, Brown MA, et al. Definition of ambulatory blood pressure targets for diagnosis and treatment of hypertension in relation to clinic blood pressure: prospective cohort study. Bmj. 2010;340.
10. Gómez-Peralta F, Pinés-Corrales PJ, Santos E, Cuesta M, González-Albarrán O, Azriel S, et al. Autoimmune Type 1 Diabetes: An Early Approach Appraisal for Spain by the AGORA Diabetes Collaborative Group. Journal of Clinical Medicine. 2025;14:418.
11. Hammami R, Jdidi J, Mroua F, Kallel R, Hentati M, Abid L, et al. Accuracy of the TIMI and GRACE scores in predicting coronary disease in patients with non-ST-elevation acute coronary syndrome. Rev Port Cardiol (Engl Ed). 2018;37:41-9.
12. Sura Kishore Mishra AS, Trinath Kumar Mishra. Association of Severity of Coronary Artery Disease with Left Ventricular Diastolic Dysfunction among Diabetics with Stable Ischaemic Heart Disease: A Cross-sectional Study from Odisha, India. Journal of Clinical and Diagnostic Research. 2022;16:OC05-OC9.
13. Xu M, Chen H, Li HW. The association between SYNTAX score and long-term outcomes in patients with unstable angina pectoris: a single-centre retrospective study. BMC Cardiovasc Disord. 2022;22:155.
14. Zhang B, Pei C, Zhang Y, Sun Y, Meng S. High Resting Heart Rate and High BMI Predicted Severe Coronary Atherosclerosis Burden in Patients With Stable Angina Pectoris by SYNTAX Score. Angiology. 2018;69:380-6.
15. Bayam E, Kalçık M, Öztürkeri B, Yıldırım E, Karaduman A, Kalkan S, et al. The relationship between H2FPEF and SYNTAX scores in patients with non-ST elevation myocardial infarction. Acta Cardiol. 2021;76:870-7.
16. Minamisawa M, Miura T, Motoki H, Kobayashi H, Kobayashi M, Nakajima H, et al. Prediction of 1-year clinical outcomes using the SYNTAX score in patients with prior heart failure undergoing percutaneous coronary intervention: sub-analysis of the SHINANO registry. Heart Vessels. 2017;32:399-407.
17. Lin T, Wang L, Guo J, Liu P, Chen L, Wei M, et al. Association Between Serum LDL-C and ApoB and SYNTAX Score in Patients With Stable Coronary Artery Disease. Angiology. 2018;69:724-9.
18. Ho AB, Tran QB. The Role of N-Terminal-Pro-B-Type Natriuretic Peptide (NT-proBNP) and High-Sensitivity Troponin T (Hs-Troponin T) in the Evaluation of the Syntax Score in Patients With Acute Coronary Syndrome. Cureus. 2024;16:e55653.
19. Mishra S, Santra A, Mishra T. Association of Severity of Coronary Artery Disease with Left Ventricular Diastolic Dysfunction among Diabetics with Stable Ischaemic Heart Disease: A Cross-sectional Study from Odisha, India. Journal of Clinical and Diagnostic Research. 2022;16:OC 05-9.
20. Mansour H, Nassar AI, Abdel Rehim WA, Roushdy AM, Abobakr M, Zaki HM, et al. Can Tei Index Predict High Syntax Score in Patients with Chronic Coronary Syndrome and Normal Left Ventricular Systolic Function? J Cardiovasc Echogr. 2021;31:11-6.
21. Türkoğlu C, Şeker T, Genç Ö, Yıldırım A, Topuz M. The Relationship Between H2FPEF Score and Coronary Slow Flow

Phenomenon. Turk Kardiyol Dern Ars. 2022;50:242-9.
22. Abalı G, akpınar O, Nisanoğlu V, Ilgenli T. Severity of Coronary Artery Disease and Echocardiographic Parameters of Ventricular Diastolic Function. Echocardiography (Mount Kisco, NY). 2013;31.
23. Suzuki S, Kaikita K, Yamamoto E, Sueta D, Yamamoto M, Ishii M, et al. H(2) FPEF score for predicting future heart failure in stable outpatients with cardiovascular risk factors. ESC Heart Fail. 2020;7:65-74.
24. Sun Y, Wang N, Li X, Zhang Y, Yang J, Tse G, et al. Predictive value of H(2) FPEF score in patients with heart failure with preserved ejection fraction. ESC Heart Fail. 2021;8:1244-52.

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