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CHA2DS2-VASc Score as Apredictor for Severity of Coronary Artery Disease and Thrombus Burden in Patients with Acute ST segment Elevation Myocardial Infarction (STEMI) Undergoing Primary Percutaneous Intervention

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Abstract:

Background:CHA2DS2-VASc score has a close association with adverse outcomes and cardiovascular prognosis in a broad range of patient populations such as heart failure, stable CAD, and ACS, regardless of having AF, but the predictive value of this score on coronary atherosclerotic burden in ACS still remains unclear.

Objective: To improve the quality of health service by introducing a simple score for physicians for easy risk stratification for patients presented with acute STEMI.

Methods: One hundred patients were enrolled; All patients were subjected to history, examination, ECG, echocardiography, CHA2DS2-VASc score calculation and coronary angiography to assessseverity of coronary artery disease by SYNTAX score and thrombus burden assessment by the thrombolysis in myocardial infarction (TIMI) grade.

Results: Thediagnostic accuracy ofCHA2DS2-VASc Score in prediction of no of multi-vessel disease, the best cutoff point was score >4 with 73.7% sensitivity and 60% specificity. While its diagnostic accuracy in prediction of severity of CAD based on high SS, the best cutoff point was score >4 with 87% sensitivity and 57.1% specificity. Finally, its diagnostic accuracy in prediction of severity of high thrombus grade, the best cutoff point was score >4 with 72% sensitivity and 66% specificity.CHA2DS2-VASc > 4 is an independent predictor of high thrombus burden and had significant positive correlation with high thrombus burden, p 0.011 and OR 3.9.

Conclusion:CHA2DS2-VASc score is a good and reliable predictor of intracoronary thrombus burden and severity of CAD in ST segment elevation myocardial infarction patients undergoing primary PCI.

Key words: CHA2DS2-VASc Score,Coronary artery disease, STEMI, thrombus burden.

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1. Introduction

Acute myocardial infarction has a high mortality rate, but emergency coronary revascularization has dramatically improved**.** Intracoronary thrombus formation due to atherosclerotic plaque rupture and the interruption of coronary blood flow constitute the main pathophysiology underlying acute coronary syndrome. The quantity of the intracoronary thrombus burden is associated with a poor prognosis in patients with Acute coronary syndrome.**[1]**

The CHA2DS2-VASc score (congestive heart failure [CHF]; hypertension; age ≥75 years[doubled]; type 2 diabetes; previous stroke or transient ischemic attack [doubled]; vascular disease; age 65–74 years; and sex [female] category) has been originally recommended for the assessment of the risk of thromboembolic event in patients with atrial fibrillation (AF) **[2].**

This score has recently been used to predict adverse clinical events in various cardiovascular diseases apart from thromboembolic risk in AF. Numerous studies have demonstrated an association of the CHA2DS2-VASc score with adverse outcomes and cardiovascular prognosis in a broad range of patient populations such as heart failure, stable CAD, and ACS, regardless of having AF .But the predictive value of this score on coronary atherosclerotic burden in ACS still remains unclear**[3]**

We aimed to improve the quality of health service by introducing a simple score for physicians for easy risk stratification for patients presented with acute STEMI**.**

2. Material and methods:

2.1.Patient population

This is a cross-sectional randomized study including a total of 100 patients with evidence of acute STEMI planned for primary percutaneous coronary intervention admitted to Zagazig university hospitals. Patients were enrolled in the study after obtaining their written informed consent, and approval of the local ethics committee of the hospital.

2.2.Exclusion Criteria

Patients with, prior CABG, history of coronary revascularization before trial entry, History of end-stage renal disease (estimated glomerular filtration rate [eGFR]<30 mL/min/1.73 m2, either with or without preexisting dialysis)and active/chronic inflammatory disorderwere excluded from our study.

After exclusion of non-responders, drop out participants and those with exclusion criteria, 100 patients completed the study (this number was considered suitable enough sample for statistical analysis with significant results and correlations).

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2.3.Methods

All patients were subjected to detailed history, including CAD risk factors, physical examination, Electrocardiography (ECG)was done for all patients 10 minutes' maximum from first medical contact to detect ST segment elevation and T wave abnormalities for diagnosis of acute STEMI and laboratory investigations included, cardiac biomarkers were measured, serum creatinine, lipid profile, CBC and mean platelets volume.

Echocardiographic images were obtained in the parasternal long-axis and short-axis and apical two-chamber and four-chamber views using standard transducer positions. Vivid 9, General Electric Healthcare (GE Vingmed, Norway) equipped with a harmonic M5S variable-frequency (1.7-4 MHz) phased-array transducer was used. LV systolic function. Using standard echocardiographic views, EDD, ESD, PWD, IVSD, FS and LVEF were measured in accordance with the recommendations of the American Society of Echocardiography.

CHA2DS2-VASc score was calculated for each patient on admission according to their demographic and echocardiographic characteristics (patients were given 1 point (combination risk factor) for CHF, hypertension, age 65 to 74 years, diabetes mellitus, vascular disease, and female gender, and 2 points (definitive risk factor) for age75 years and previous stroke or transient ischemic attack). **[4]**

Hundred patients underwent primary PCI by femoral approach in multiple views using Sildenger technique. CAs were analyzed by experienced angiographer who was blinded to clinical status of the patients. Right anterior oblique and left anterior oblique views were used for evaluation of the left and right coronary system, respectively.

Severity of coronary artery disease was calculated with **SYNTAX score** depending on angiographic findings in the primary percutaneous angiography. To calculate SS, each lesion with ≥50% diameter stenosis in vessels ≥1.5 mm in diameter was scored using the official website online calculator (www.syntaxscore.com). **[5]**

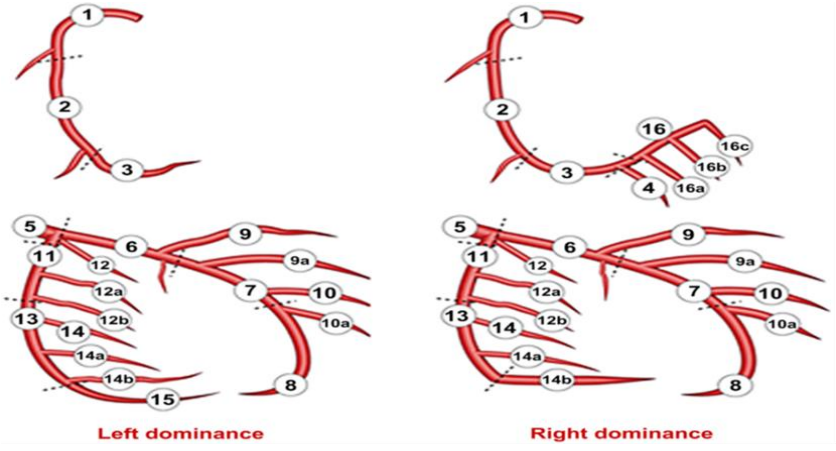

Figure 1: Modified AHA Coronary Segment Classification Used in the SS (left and right dominance).**[6]**

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Assessment of the **thrombus burden** by thrombus grade after restoring ante grade flow through guide wire or small balloon dilatation. Angiographic thrombus burden was classified as previously defined by the thrombolysis in myocardial infarction (TIMI) study group as follow:

Table (1) Thrombus burden grade**[6]**

Thrombus burden grade	Description
Grade 0	no evidence of thrombus.
Grade 1	suspected thrombus (low contrast density, haziness, irregular lesion contour, or a smooth convex meniscus at the site of occlusion)
Grade 2	definite thrombus and the thrombus greatest dimensions _1/2 vessel diameter
Grade 3	definite thrombus and the thrombus greatest dimension >1/2 to <2 vessel diameters
Grade 4	definite thrombus and the thrombus greatest dimension>2 vessel diameters
Grade 5	total thrombotic occlusion.

Recording results of primary PCI (intervention which was done and final results as final TIMI, ST segment resolution, and clinical outcomes as chest pain durability and occurrence of major cardiac events or not)

2.4.Statistical analysis:

Statistical analysis was performed using Statistical Package for The Social Sciences Version 22 (IBM Corp., Armonk, NY, USA). Quantitative data are expressed as means and standard deviations.

P-Value ≤ 0.05 was considered to indicate significance. Correlation analysis assesses the strength of association between two variables. Multiple logistic regression analysis was used for independent predictors of high thrombus burden.

3. Results:

The patients were classified into 3 groups according to severity of coronary artery disease into group I, 23 patients with high SS and group II, 32 patients with intermediate SS and group III, 45 patients low SS.

Then they were classified into 2 groups according to thrombus burden into group I, 50 patients with low thrombus burden and group II, 50 patients with high thrombus burden

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Regarding demographic data between low, intermediate and high SYNTAX score groups, mean age was 62.87±10.10, 65.81±9.82 and 68.09±9.04 respectively with non-significant difference, p 0.103 and for sex distribution it was also non-significant p 0.587. Risk factors between the three groups, there was non-significant statistical difference regarding smoking, HTN and dyslipidemia, p values 0.514, 0.153 and 0.927 respectively. There was only significant difference between the three groups regarding DM, p value 0.03, as shown in table 2.

Regarding demographic data between low and high thrombus burden groups, mean age was 62.96±9.21 and 67.06±10.25 respectively with significant difference, p 0. 038 and for sex distribution it was non-significant p 0.839. Risk factors between the two groups, there was non-significant statistical difference regarding smoking, HTN and dyslipidemia, p values 0.418, 0.829 and 0.839 respectively. There was only significant difference between the two groups regarding DM, p value 0.009, as shown in table 3.

Regarding laboratory data between low, intermediate and high SYNTAX score groups, there was a significant decrease between low and high groups regarding HDL with p value 0.011, also, for HB there was a significant decrease between low and high & low and intermediate groups with p value ≤0.001. Other laboratory parameters show non-significant difference between the three groups, table 4.

Regarding laboratory data between low and high thrombus burden groups, there was a significant increase between low and high groups regarding TG with p value 0.026, also, for HDL and HB there was a significant decrease between low and high groups with p value 0.042 and 0.033 respectively. Other laboratory parameters show non-significant difference between the two groups, table 5.

Regarding Echo data between low, intermediate and high SYNTAX score groups, there was a significant decrease between low and high groups regarding LVEF with p value 0.006. Regarding LVEDD and LVESD there was non-significant difference between the three groups with p value 0.579 and 0.113 respectively (table 6)

Regarding Echo data between low and high thrombus burden groups, there was a significant decrease between low and high groups regarding LVEF with p value ≤0.001. Regarding LVEDD and LVESD there was a significant increase between the two groups with p value 0.01 and ≤0.001respectively (table 7)

There was a significant difference between number of vessels involved and CHA2DS2-VASc Score with p value 0.028 for single vessel, ≤0.001 for two vessels and 0.011 for multi-vessel affection, table 8. Regarding diagnostic accuracy of CHA2DS2-VASc Score in prediction of no of multi-vessel disease, the best cutoff point was score >4 with 73.7% sensitivity and 60% specificity, table 9, figure 2.

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There was a significant difference between SYNTAX score and CHA2DS2-VASc Score with p value ≤0.001 for low SS, ≤0.001 for intermediate SS and 0.008 for high SS, table 10. Regarding diagnostic accuracy of CHA2DS2-VASc Score in prediction of severity of CAD based on high SS, the best cutoff point was score >4 with 87% sensitivity and 57.1% specificity, table 11, figure 3.

There was a significant difference between thrombus grade and CHA2DS2-VASc Score with p value ≤0.001 between the two groups, table 12. Regarding diagnostic accuracy of CHA2DS2-VASc Score in prediction of severity of high thrombus grade, the best cutoff point was score >4 with 72% sensitivity and 66% specificity, table 13, figure 4.

Multivariate analysis for detection of independent predictors of high thrombus burden, it was found that only CHA2DS2-VASc > 4 had significant positive correlation with high thrombus burden, p 0.011 and OR 3.9 (1.4-11.4), table 14.

Table (2):Relation between socio demographic data, risk factors and SYNTAX score

Variables	SYNTAX score			Test of significance	P value
	Low (n=45)	Intermediate (n=32)	High (n=23)		
Age (years) Mean ± SD	62.87±10.10	65.81±9.82	68.09±9.04	F=2.33	0.103
Sex					
Male	29 (64.4%)	17 (53.1%)	13 (56.5%)	χ^2=1.07	0.587
Female	16 (35.6%)	15 (46.9%)	10 (43.5%)		
Smoking					
Yes	17 (37.8%)	13 (40.6%)	12 (52.2%)	χ^2=1.33	0.514
No	28 (62.2%)	19 (59.4%)	11(47.8%)		
HTN					
Yes	33 (73.3%)	18 (56.2%)	18 (78.3%)	χ^2=3.75	0.153
No	12 (26.7%)	14 (43.8%)	5 (21.7%)		
Dyslipidemia					
Yes	27 (60%)	18 (56.2%)	14 (60.9%)	χ^2=0.152	0.927
No	18 (40%)	14 (43.8%)	9 (39.1%)		
DM					
Yes	18 (40.0%)	16 (50%)	17 (73.9%)	χ^2=7.02	0.03*
No	27 (60%)	16 (50%)	6 (26.1%)		

Table (3): Socio demographic data and risk factors among low and high thrombus grade groups.

Variables	Thrombus grade		Test of significance	P value
	Low (n=50)	High (n=50)		
Age (years) Mean ± SD	62.96±9.21	67.06±10.25	t=2.10	0.038*
Sex				
Male	30 (60%)	29 (58%)	χ^2=0.041	0.839

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Female	20 (40%)	21 (42%)		
Smoking **Yes** **No**	 19 (38%) 31 (62.0%)	 23 (46%) 27 (54.0%)	χ^2=0.657	0.418
HTN **Yes** **No**	 35 (70%) 15 (30%)	 34 (68%) 16 (32%)	χ^2=0.047	0.829
Dyslipidemia **Yes** **No**	 30 (60%) 20 (40%)	 29 (58%) 21 (42%)	χ^2=0.041	0.839
DM **Yes** **No**	 19 (38%) 31 (62%)	 32 (64%) 18 (36%)	χ^2=6.76	0.009*

Table (4): Relation between SYNTAX score and laboratory investigations.

Variables	**SYNTAX score**			**Test of significance**	**P value**
	Low (n=45)	**Intermediate (n=32)**	**High (n=23)**		
TG	180.24±65.62	145.82±60.77	159.16±63.49	F=2.83	0.063
Cholesterol	183.71±36.82	171.34±31.99	193.87±46.39	F=2.45	0.092
LDL	92.49±17.41	86.19±13.77	95.83±25.12	F=2.01	0.14
HDL	54.38±9.36 [a]	49.63±8.86	47.56±10.04 [a]	F=4.77	0.011*
HB	13.92±1.29 [ab]	12.94±1.43 [b]	12.57±1.57 [a]	F=8.68	≤0.001*
WBCs	11.02±2.93	11.37±3.44	12.87±2.22	F=3.05	0.052
Plts	265.53±72.90	252.78±80.14	250.78±73.32	F=0.407	0.667
Creat	0.99±0.19	0.96±0.12	1.02±0.16	F=1.16	0.318
CKMB Median (Min-Max)	75 (44-559)	85 (48-158)	99 (42-165)	KW=3.75	0.153
Tpn Median (Min-Max)	2.8 (1-24)	3.35 (1.2-6)	3.0 (1.2-4)	KW=1.66	0.436

Table (5): Laboratory investigations among low and high thrombus grade groups

Variables	**Thrombus grade**		**Test of significance**	**P value**
	Low (n=50)	**High (n=50)**		
TG	150.07±65.11	178.69±61.84	t=2.25	0.026*
Cholesterol	180.98±36.33	183.20±40.64	t=0.288	0.774
LDL	91.34±16.93	91.14±20.41	t=0.053	0.958
HDL	53.26±10.09	49.32±9.00	t=2.06	0.042*
HB	13.61±1.35	12.97±1.59	t=2.16	0.033*
WBCs	11.10±3.04	12.02±2.97	t=1.53	0.129
Plts	257.14±74.71	258.98±75.89	t=0.122	0.903
Creat	0.99±0.18	0.99±0.13	t=0.111	0.912
CKMB	75.5 (44-559)	85 (42-165)	Z=0.979	0.327
Tpn	2.75 (1-24)	3 (1.2-6.2)	Z=1.32	0.186

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Table (6): ECHO data and SYNTAX score

Variables	SYNTAX score			Test of significance	P value
	Low (n=45)	Intermediate (n=32)	High (n=23)		
LVEDD	5.05±0.66	5.21±0.62	5.14±0.75	F=0.549	0.579
LVESD	3.54±0.67	3.77±0.61	3.88±0.82	F=2.24	0.113
LVEF	56.80±8.83 [a]	52.44±9.83	49.00±10.67 [a]	F=5.38	0.006*

abc: similar letters indicate significant difference between groups

Table (7): ECHO data among low and high thrombus grade groups

Variables	Thrombus grade		Test of significance	P value
	Low (n=50)	High (n=50)		
LVEDD	4.95±0.64	5.29±0.66	t=2.63	0.01*
LVESD	3.44±0.63	3.94±0.68	t=3.82	≤0.001*
LVEF	57.66±8.18	49.56±10.10	t=4.41	≤0.001*

Table (8): Relation between no of vessels involved and CHA2DS2-VASc Score

CHA2DS2-VASc Score	No of vessels involved			Test of significance
	Single	Two vessels	Multi vessels	
Median (min-max)	3 (1-5)	4 (1-6)	4 (1-8)	Kw=19.55 P ≤0.001*
P value	P1=0.028*	P2≤0.001*	P3=0.011*	-

Table (9): Receiver operating characteristic curve (ROC) for diagnostic accuracy of CHA2DS2-VASc Score in prediction of no of vessels involved (Multi vessels)

AUC	95% CI		Cutoff	Sensitivity	Specificity	PPV	NPV	Accuracy
	Lower	Upper						
0.726	0.624	0.827	>4	73.7%	60%	52.8	78.7	65%

PPV: Positive, Predictive Value, NPV: Negative Predictive Value, AUR: Area Under Receiver Operating Characteristic curve, 95%CI: 95% Confidence Interval.

Table (10): Correlation between SYNTAX score and CHA2DS2-VASc Score

CHA2DS2-VASc Score	SYNTAX score			Test of significance
	Low	Intermediate	High	
Median (min-max)	3 (1-5)	4 (2-6)	5 (3-8)	Kw=37.07 P ≤0.001*
P value	P1≤0.001*	P2≤0.001*	P3=0.008*	-

P1: comparison between low and Intermediate

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P2: comparison between low and High

P3: comparison between Intermediate and High

Table (11): Receiver operating characteristic curve (ROC) for diagnostic accuracy of CHA2DS2-VASc Score in prediction of severity of CAD (High SS)

AUC	95% CI		Cutoff	Sensitivity	Specificity	PPV	NPV	Accuracy
	Lower	Upper						
0.815	0.719	0.910	>4	87%	57.1%	62.5	91.6	64%

AUC: area under the curve, CI: confidence interval, PPV: positive predictive value, NPV: negative predictive value

Table (12): Correlation between Thrombus grade and CHA2DS2-VASc Score

CHA2DS2-VASc Score	Thrombus grade		Test of significance
	Low	High	
Median (min-max)	3 (1-5)	4 (2-8)	Z=5.02 P ≤0.001*

Table (13): Receiver operating characteristic curve (ROC) for diagnostic accuracy of CHA2DS2-VASc Score in prediction of high thrombus burden

AUC	95% CI		Cutoff	Sensitivity	Specificity	PPV	NPV	Accuracy
	Lower	Upper						
0.785	0.697	0.872	> 4	72%	66%	67.9	70.2	69%

AUC: area under the curve, PPV: positive predictive value, NPV: negative predictive value

Table (14): Multivariate logistic regression analysis for independent predictors of high thrombus burden

Age	0.019	0.027	0.481	1.02 (0.9-)1.07
CHA2DS2-VASc >4	1.374	0.543	0.011*	3.9 (1.4-11.4)
LVEDD	1.582	1.115	0.156	4.8 (-0.5-43)
LVESD	-1.340	1.583	0.397	0.26 (0.01-5.8)
LVEF	-0.131	0.070	0.062	0.88 (0.76-1)
TG	-0.008	0.004	0.060	0.99 (0.98-1)
HDL	-0.026	0.028	0.361	0.97 (0.92-1.03)
HB	-0.258	0.195	0.187	0.77 (0.52-1.13)
DM	0.604	0.541	0.264	1.8 (0.6-5.3)

OR: odds ratio, CI: confidence interval

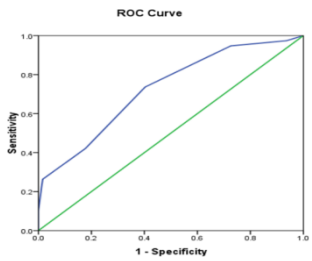

Figure 2:ROC for diagnostic accuracy of CHA2DS2-VASc Score in prediction of Multi vessels

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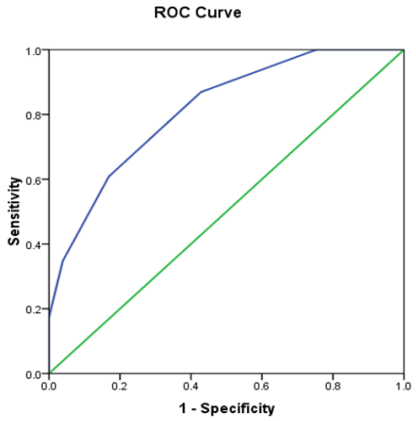

Figure3:ROC for diagnostic accuracy of CHA2DS2-VASc Score in prediction of severity of CAD

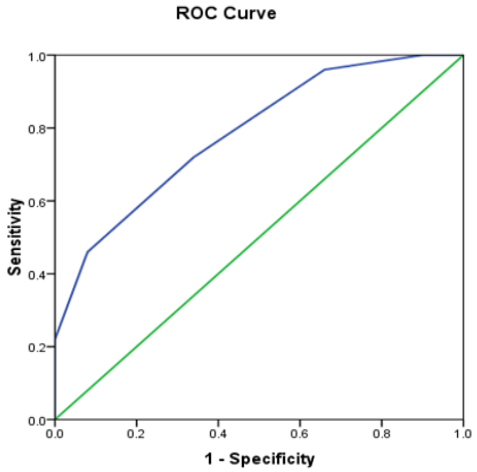

Figure 4:ROC for diagnostic accuracy of CHA2DS2-VASc Score in prediction of high thrombus burden

4. Discussion:

Intracoronary thrombus formation due to atherosclerotic plaque rupture and the interruption of coronary blood flow constitute the main pathophysiology underlying acute coronary syndrome. The severity of the intracoronary thrombus burden is associated with a poor prognosis in patients with Acute coronary syndrome. **[7].**

The CHA2DS2-VASc score has a close association with adverse outcomes and cardiovascular prognosis in a broad range of patient populations such as heart failure, stable CAD, and ACS, regardless of having AF. But the predictive value of this score on coronary atherosclerotic burden in ACS still remains unclear. **[3]**

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Our study is a cross sectional study included 100 patients with evidence of acute STEMI planned for primary percutaneous coronary intervention of Zagazig University Hospitals from the period of 2019 to 2020.

Regarding demographic data between low, intermediate and high SYNTAX score groups, mean age was 62.87±10.10, 65.81±9.82 and 68.09±9.04 respectively with 29 (64.4%) males and 16 (35.6%) females in low group, 17 (53.1%) males and 15 (46.9%) females in intermediate group and 13 (56.5%) males and 10 (43.5%) females in high group.

This was **discordant** with Kurtul et al, 2222 patients divided into three groups, low, intermediate and high SS which had a mean age of 57.8 ± 12.2, 60.8 ± 12.1 and 70.0 ± 12.3 respectively with p value <0.001 and regarding gender, they included 350 (24.2%), 160 (28.8%) and 87 (39.4%) females respectively with p value <0.001 **[8]**.

Regarding risk factors between the three groups, there was only significant correlation between the three groups regarding DM, p value 0.03. This was **concordant** with Kurtul and Acikgoz who found a significant correlation between the three groups regarding DM with p value <0.001 **[8].**

There was non-significant statistical correlation regarding smoking, HTN and dyslipidemia, p values 0.514, 0.153 and 0.927 respectively.This was **discordant** with Kurtul et al, regarding HTN which has 547 (37.9%) in group I, 227 (41.0%) in group II and 115 (52.0%) in group III with p value <0.001. Current smokers were (56.2), (49.0%) and (42.3%) respectively with p value <0.001. **[8].** This discrepancy may be due to small sample size of us.

Their results were **concordant** with us regarding hypercholesterolemia as it was 427 (29.6%), 160 (28.8%) and 63 (28.5%) respectively between the three groups with non-significant correlation p value 0.913. **[8].**

Regarding demographic data between low and high thrombus burden groups, there was significant correlation, p 0. 038 and for sex distribution it was non-significant p 0.839. This was **concordant** with Seyis et al who stated that patients with high thrombus burden were significantly older (65.8 ± 11.6 y vs. 57.8 ± 10.3 y, p<0.001), while regarding gender it was non-significant between the two groups with p value 0.498. **[9].** Also Zhang et al had the same results regrading age and gender distribution. **[10]**

Regarding risk factors between the two groups, there was only significant correlation between the two groups regarding DM, p value 0.009. This was **concordant** with Steyis et al regarding diabetes mellitus 27.7%, and 72.9% respectively between the two groups with p value <0.001 **[9]**. Also, Satılmış and Durmuşhad the same results **[11]**

There was non-significant statistical correlation regarding smoking, HTN and dyslipidemia, p values 0.418, 0.829 and 0.839 respectively. This was **concordant** with Satılmış and Durmuş, who found non-significant correlation regarding smokers

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and dyslipidemia with p values 0.43 and 0.49 respectively. They were **discordant** with our results regarding hypertension which was significant with p value <0.001. **[11].** This may be due to small sample size of us. Also,**[12]**found the same results which was discordant with us.

Our results showed about laboratory data between low, intermediate and high SYNTAX score groups, there was a significant correlation between low and high groups regarding HDL with p value 0.011. This was **discordant** with Kurtul and Acikgozregarding HDL which had mean of 40 ± 9, 40 ± 10 and 39 ± 10 respectively with non-significant difference p value 0.485. **[8]**

Also, for HB there was a significant correlation between low and high & low and intermediate groups with p value ≤0.001. This was **concordant** with Kurtul et al regarding HB between the low, intermediate and high SYNTAX score groups with mean 14.3 ± 1.7, 14.0 ± 1.9 and 13.2 ± 1.8 respectively and p value <0.001. **[8]**

Other laboratory parameters show non-significant difference between the three groups. This was concordant with our results regarding platelets count, TG, LDL and creatinine which all had non-significant difference between the three groups. **[8]**

Also, serum troponin, CKMB and WBCs count had significant difference between the three groups with p value s<0.001, 0.002 and 0.007 respectively which was **against** our results. **[8]**

Regarding laboratory data between low and high thrombus burden groups, there was a significant correlation between low and high groups regarding TG with p value 0.026. This was **discordant** with results done by Seyis et al p value 0.48. **[9].** Also, Açikgöz et al, were **discordant** with us regarding TG between the two group with p values 0.233, **[13]**

Regarding HDL between low and high thrombus burden groups, there was a significant correlation between low and high groups regarding TG with p value 0.042. This was **discordant** with results done by Seyis et al, p value 0.231**[9]**. Also, Açikgöz et al, were **discordant** with us regarding HDL between the two group with p values 0.306, **[13]**

Regarding HB between low and high thrombus burden groups, there was a significant correlation between low and high groups regarding TG with p value 0.033. This was **discordant** with results done by Seyis et al, mean hemoglobin was 13.1 ± 1.6 and 12.9 ± 1.6 with p value 0.39 **[9].** Also, Açikgöz et al, were **discordant** with us regarding HB between the two group with p values 0.45**[13]**

Also All other laboratory parameters had non-significant correlation between the two groups which was **concordant** with our results. **[9]**, **[13]**, **[11]**

Regarding Echo data between low, intermediate and high SYNTAX score groups, there was a significant correlation between low and high groups regarding

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LVEF with p value 0.006. Kurtul and Acikgoz stated the same results with p value <0.001, this was **concordant** with our study results. **[8]**

Regarding LVEDD and LVESD there was non-significant correlation between the three groups with p value 0.579 and 0.113 respectively, which was concordant with **[8]**

Regarding Echo data between low and high thrombus burden groups, there was a significant correlation between low and high groups regarding LVEF with p value ≤0.001. Satılmış and Durmuş stated the same results with p value 0.03, this was **concordant** with our results. **[11]**. Also, Seyis et al were **concordant** with us with p value <0.001. **[9]**

Açikgöz et al were **discordant** with us regarding LVEF with mean of 47 ± 11 and 51 ± 11 respectively between the two groups with p value 0.394. **[13].** This may because they excluded systolic dysfunction patients

Regarding LVEDD and LVESD there was a significant correlation between the two groups with p value 0.01 and ≤0.001respectively. This was **concordant** with **[9]**

We found a significant correlation between CHA2DS2-VASc Score and number of vessels involved with p value ≤0.001. This was **concordant** with Satılmış and Durmuş who stated that multi-vessel disease affection had a significant correlation with CHA2DS2-VASc Score with p value 0.01. **[11]**. Meanwhile it was **discordant** with Hudzik et al who stated that multi-vessel CAD, had non-significant correlation with CHA2DS2-VASc Score with p value 0.6. **[14]**

There was a significant correlation between CHA2DS2-VASc Score and SYNTAX score with p value ≤0.001. Kurtul and Acikgoz stated that there was a significant correlation between SYNTAX score and CHA2DS2-VASc Score between low, intermediate and high SS groups with mean of 2.40 ± 1.36, 2.89 ± 1.49 and 4.24 ± 1.49 respectively and p value <0.001, which was in **concordance** with our results. **[8]**

They also stated that CHA2DS2-VASc score calculated in ACS patients could predict the presence of high SS, and hypothesized that the rate of in-hospital mortality would be greater among patients with higher CHA2DS2-VASc scores. Consequently, they found that CHA2DS2-VASc score was independently associated with high SS in ACS. They also found that both CHA2DS2-VASc score and the presence of high SS were independent risk factors for in-hospital all-cause mortality. **[8]**

There was a significant correlation between thrombus grade and CHA2DS2-VASc Score with p value ≤0.001 between the two groups. In **concordance** with our results, Seyis et al stated that CHA2DS2-VASc score had a median of 1 ± 2 and 4 ± 3

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between high and low thrombus grade groups with p value <0.001. **[9]**. Also,Satılmış and Durmuş**[11]** had the same results.

Multivariate analysis for detection of independent predictors of high thrombus burden, it was found that only CHA2DS2-VASc > 4 had significant positive correlation with high thrombus burden, p 0.011 and OR 3.9 (1.4-11.4).

In **concordance** with our results, Açikgöz et al stated that stepwise multivariate logistic regression analysis revealed that the CHA2DS2-VASc score (odds ratio [OR] = 1.390, 95% confidence interval [CI]= 1.118-1.728; P = 0.003)**[13].**Seyis et al andSatılmış and Durmuş**[11]**,**[9]**stated that in multivariable logistic regression analyses, they found the same results which was in **concordance** with ours.

Chan et al stated that regarding the fact that CHA2DS2-VASc score has high predictive power of thromboembolic events and includes the common risk factors of no-reflow and thromboembolism concurrently, it can be used as an exclusive risk estimation tool in high thrombus burden patients. **[15]**

5. Limitations

Inadequate sample size to continue significant groups analysis so we need a larger study for confirmation of our results. Some patients might have had undiagnosed peripheral artery disease at the time of angiography and this may affect CHA2DS2-VASc score. Finally, the definition of coronary artery disease was based on angiographic views by 2D X-ray, we did not use IVUS or FFR to assess size of the thrombus and thus thrombus burden which may interfere with the decision of the interpretation of coronary angiography

6. Conclusion

CHA2DS2-VASc score is a good and reliable predictor of intracoronary thrombus burden and severity of coronary artery disease in ST segment elevation myocardial infarction patients undergoing primary PCI.

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