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ORIGINAL ARTICLE

Clinical and Angiographic Characteristics, in Hospital and Short-Term Outcomes in Patients with ST Elevated Myocardial Infarction, Undergoing Primary Percutaneous Intervention

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Abstract

Background: *Acute myocardial infarction is considered one of the common causes of morbidity and mortality across the world.*
Objective: *We aimed to evaluate baseline demographic/clinical, angiographic characteristics, in-hospital and short-term outcomes among patients with ST-elevation myocardial infarction (STEMI) who underwent primary percutaneous coronary intervention.*
Patients and Methods: *Medical records of STEMI patients (n=57) were reviewed at Erbil Cardiac Center and were followed up prospectively, immediately and 1 month postoperatively (June-August 2022).*
Results: *The mean age of the patients was 57 (37-78 years). Smoking and hypertension were the most prevalent risk factors. The ECG findings revealed that the ST elevation was mostly of the inferior pattern followed by extensive anterior, anteroseptal, lateral, inferior-posterior, and anterolateral patterns, respectively. The study found that 23.58% had impaired ejection fraction before and after PPCI. The angiographic findings regarding the dominancy profile were the right dominant (74.53%), left dominant (21.70%) and co-dominant (3.77%). The most prevalent culprit coronary was LAD (proximal segment). Most of the patients had a grade 0 of TIMI flow (62.26%) followed by a grade of 3. The lesions were mostly >20 mm in length followed by 10-20 mm, and less commonly <10 mm, and mostly were non-angulated with irregular contours. The study showed that (39.62%) had mild calcification followed by moderate (24.53%) and severe (6.60%) and most patients had total occlusion. The patients had minor complications only four patients died and one patient failed PCI.*
Conclusions: *The study showed that STEMI patients who underwent PPCI have rather low complications, mortality*

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Keywords: STEMI, PCI, Acute myocardial infarction, angiography, mortality

1. INTRODUCTION

Acute myocardial infarction (AMI) is considered one of the common causes of morbidity and mortality across the world. Despite respectable advancements within the management of infarction, there is substantial scope for the betterment of the result of the patients (1). ST-segment elevation myocardial infarction (STEMI) is considered the most common cause of emergency admission and cardiovascular mortality. This medical condition poses a significant burden on global healthcare systems in both developing and developing countries. Based on the latest global statistics, STEMI is responsible for close to a rate between 25% and 40% of heart attacks. Despite the high rate of cardiac attack, the survival rate of acute STEMI has been improved owing to some factors; including easy symptom recognition by clinicians, more acute diagnoses, and effective time reperfusion. Some other factors that have a role in reducing the mortality rate following a heart attack by STEMI are a higher rate of use of percutaneous coronary intervention (PCI), antithrombotic therapy, and secondary cardiovascular prevention strategies (1). Currently, primary PCI is considered the gold-standard reperfusion strategy in the management of STEMI. The time-saving in admission and performing the PCI has resulted in a significant decline in morbidity and mortality rates among patients with STEMI (2). A meta-analysis of 46 randomized clinical trials reported that PCI impacts mortality; PCI prevents death, cardiac death, and MI in patients with unstable coronary artery diseases (CAD). For patients with stable CAD, PCI shows no evidence of an effect on any of these outcomes. Among patients with CAD, PCI decreased cardiac mortality by 31% (10%-47%; P=0.007) and MI by 26% (10%-38%; P=0.002) (3). A retrospective analysis of patients with STEMI included 8665. They included a random sample of the patients who received PPCI (n=6623) and nPPCI (n=2042) were the other interventions implemented when PPCI interventions were unavailable. The nPPCI included post-fibrinolysis PCI strategies and PCI without fibrinolysis. They compared the clinical outcomes between PPCI and nPPCI groups. The study showed that nPPCI had longer symptoms onset to hospital arrival time (347.5 vs. 195.0 minutes, and door-to-balloon time (108 minutes vs. 75 minutes). In addition, they were less likely to receive a coronary stent (89.4% vs. 95%) and were less likely to be referred to for cardiac rehabilitation (20.2% vs. 24.2%). The study groups were not statistically

different in terms of in-hospital and 30-day MACE (4). Coronary angiography is currently the most common method for interventional cardiologists to assess coronary lesions and make revascularization decisions. Angiographic lesion characteristics are important prognostic factors, which may contribute to the difference in outcomes between patients with STEMI, however, we have no sufficient data on PCI and associated factors in ourregion (5, 6), therefore, establishing the predictors of STEMI and associated clinical and angiographic conditions may provide improvements in its management.

2. METHODOLOGY

Study design and sampling:

In this prospective observational study, the patients who were diagnosed with STEMI and received a primary PCI were eligible. The medical records of the patients who were diagnosed with STEMI at Erbil Cardiac Center were reviewed by the researcher for the legality criteria. The patients were followed up prospectively immediately and 1 month postoperatively for the possible clinical outcomes. In this regard, patients aged 18 years and older of both genders were included in this study regardless of socio-demographic aspects. The following patients were not included in the study, non-STEMI, unstable angina, patient with normal angiography, patients with no coronary intervention (including those referred for emergency and urgent CABG), and patients with incomplete information. The target patients were the patients who were recorded between June and August 2022 at Erbil Cardiac Center.

Measures and outcomes:

The following information was extracted from the medical records of the patients at the center. The information on the patients was recorded in the following sections of the pre-designed questionnaire. The general information about the patients was recorded in the first section of the questionnaire. The information was age, gender, and BMI. The symptoms of patients with STEMI were recorded in the next section. The symptoms were chest pain, dyspnea, sweating, nausea, vomiting, epigastric pain, back pain, jaw pain, syncope, arrest, VT, and shoulder pain. The risk factors were recorded in a section. The risk factors were smoking, hypertension, diabetes mellitus, dyslipidemia, a family history of CAD

(atherosclerosis diagnosed in parents or siblings < 55 years for men and < 65 for women), Prior manifestation of atherosclerotic disease (stroke/TIA, myocardial infarction, prior PCI and CABG). CKD, chemotherapy, and RA. In our study, we defined typical chest pain as precordial or retrosternal chest pain lasting for > 20 minutes, or other chest pressures or discomforts. The atypical symptom was defined as sweating, abdomen pain, back pain, jaw pain, dyspnea, syncope, sweating, nausea, or vomiting. The smoking was categorized as active smoking, abstinence from smoking occurring in less than 6 months, and non-smoker.

The center applied a 12-lead electrocardiogram, plus V3R, V4R, V7, and V8 leads in inferior infarction, which was performed at hospital admission and 30-60 minutes after the procedure. STEMI was diagnosed based on the 4th universal MI guideline. The center diagnosed the STEMI when new or presumed new ST-segment elevation ≥ 1 mm (≥ 2 mm in V1 to V3) was seen in any location in two or more contiguous leads or a new left bundle branch block was found on the index. The type and localization of myocardial infarction were determined based on the electrocardiographic (ECG) findings. It was classified as an anterior (anteroseptal, anterior, anterolateral, and extensive anterior) or inferior (inferior, lateral, and posterior) event. Door-to-balloon time was defined as the interval between hospital admission and crossing of the lesion with a predication balloon, manual thrombus aspiration catheter, or stent. Angiographic success was defined as a PCI with a reduction of target stenosis to < 20% diameter, maintaining or restoring normal antegrade flow (Thrombolysis in Myocardial Infarction - TIMI grade 3). Culprit artery was performed in the index hospitalization and for patients with multi-vessels disease (MVD), subsequent staged PCI was planned. Complications were divided into a) during PCI cardiac arrest, slow flow/no-reflow, perforation, embolization, coronary dissection, coronary perforation, and cardiac tamponed and b) during admission (vascular complications, heart failure, arrhythmic complications extracardiac complications, death) and c) at follow-up. The following complications were recorded at follow-up; AMI, new PCI, stroke, hospitalization, heart failure (NYHA I, II, III, IV), systemic embolism, pulmonary embolism, and death. This information is collected routinely by the cardiologists as per the policy of the center. In this study, the one-month clinical outcome was defined as hospitalization for any cause, MI, new PPCI, cardiovascular death, and all-cause death.

All the echocardiograms were done on GE VIVID 5 echocardiography machine. The echocardiography parameters evaluated included: Ejection fraction as impaired LV function (EF<50% or normal (EF>/50%).

Coronary angiograms were performed with PHILIPS CATH LAB on all the patients

ACS /Primary PCI is done in the case of eligible patients.

Coronary angiograms were analyzed for the following characteristics in the STEMI group:

• The number of vessels involved (normal coronary arteries, single vessel disease (SVD), double vessel disease (DVD), triple vessel disease (TVD), left main coronary artery (LMCA) involvement);

• The severity of the lesion. (Based on the percentage diameter stenosis of the involved artery compared to the normal reference segment, lesions are classified as critical if 70% or more diameter stenosis is observed in the LAD, LCX, RCA, and more than or equal to 50% diameter stenosis in the LMCA.)

• Location of the lesion in the involved artery LAD, LCX, RCA (ostial, proximal, middle, or distal/ its major branch)

• Length of the lesion: measured shoulder to shoulder in a non-foreshortened view

• The types of lesions were classified into A, B1, B2, and C 7.

Statistical analyses:

The general information of patients with STEMI who received primary PCI was presented in mean and standard deviation or number and percentage. Symptoms and risk factors of patients with STEMI who received primary PCI were determined in number and percentage. The ECG and angiographic findings, Lab results, PCI findings, and complications were determined by the mean and standard deviation or number and percentage. The significant level of difference was determined by a p-value of less than 0.050. The statistical calculations were performed by JMP pro. 14.3.0.

3. RESULTS

A total of 106 patients who presented with STEMI were eligible. The mean age of the patients was 57.69 between 37 and 78 years. Most of the patients were between 41 and 70 years old (85.85%) and were males (83.02%). The mean BMI of the STEMI patients was 29.54 (17.53-41.44) and most were obese (48.11%) or overweight (33.02%) and smokers (54.72%), see (**Table 1**). The study found that chest pain was the most prevalent symptom of STEMI patients (99.06%) most associated with sweating (71.70%). Should pain be the least associated symptom among patients (3.77%). Also, hypertension (60.38%) and smoking (54.72%) were the most prevalent risk factors for patients with STEMI, and DM (50.00%) was the third most common risk factor (**Table 2**). The ECG findings of the patients revealed that the ST elevation mostly belonged to the inferior (42.45%) pattern followed by extensive anterior (28.30%) followed by anteroseptal (13.21%), lateral (10.38%), inferior-poster (8.49%), and anterolateral (7.55%). The study found that 23.58% (n=25) had impaired EF before and after PCI. The study showed that most of the patients arrived at the hospital two hours or later (72.64%) and the majority were managed in the hospital within two hours (84.91%). The total delay of most of the patients was in two hours and more (91.51%) (**Table 3**). The mean values of biomedical measurements were HS TN (0.07), CK-MB (4.46), HS CRP (0.72), HBA1C (5.94), HB (15.1), WBC (9.70), RBS (143.3), S. Cr (0.89), B. Urea (37.58), see (**Table 4**). The angiographic findings of STEMI patients regarding dominancy profile were the right dominant (74.53%) left dominant (21.70) co-dominant (3.77). The prevalence of culprit coronary artery was LAD (48.11%), LCX (11.32%), RCA (34.91%), OM (3.77%), Diagonal (1.89%), RAMUS (0.94%), and PLV (0.94%). Most of the patients had grade 0 of TIMI (62.26%) followed by grade 3 (29.25%), grade 2 (7.55%), and grade 1 (0.94%). The prevalence of affected segments of culprit coronary artery myocardial territories was proximal (55.66%) followed by MID (32.08%), distal (10.38%), and ostium (1.89%). The study found that 9.43% of the patients had re-narrowing of a stented coronary artery lesion (ISR). The lesion lengths were mostly >20 mm (72.64%) followed by 10-20 mm (24.53%), and <10 mm (2.83%), and most were non-angulated (81.13%) and had irregular contour (87.74%). The study found that 39.62% had mild calcification followed by moderate (24.53%) and severe (6.60%). The occlusion of 61.32% of the STEMI was total and 33.96 was sub-total and 3.77% was critical.

Only one patient had intermediate occlusion. The study found that 37.74% had ostial lesions and the major branch of 93.40% of the patients with STEMI was involved. The grades of the thrombosis of STEMI patients were 0 (16.98%), 1 (14.15%), 2 (9.43%), 3 (15.09%), 4 (28.30%), and 5 (16.04%). We found that 34.91% had bifurcation lesions and 21.70% had tortuosity and 4.72% had major side branches. The involved number of vessels were single (29.25%), two (45.28%), three (23.59%), and three plus left main (1.89%) (**Table 5**). The PPCI findings of the STEMI patients showed the applied PPCI types were balloon angioplasty (7.55), balloon passing through (0.94), direct stent implantation (32.08), and stenting post-dilation (59.43). The number of stents used were 0 (5.66%), 1 (75.47%), and 2 (18.87%). The mean stent length was 31.04 mm. The study found that 3.77% (n=4) had PCI to non-culprit lesions during PPCI. The study found that only one patient had failed PCI. This study showed that most PPCI was done through access routes femoral (96.33%) and less Radial (3.77%) (**Table 6**). The PCI complications of STEMI patients were dissection (5.66%), distal embolization (20.75), slow flow (29.24), non-reflow (5.66), stent thrombosis (1.89), arrhythmia (5.66), cardiogenic shock (3.77), IABP (0.94), temporary pacemaker (0.94), dialysis (0.94), contrast nephropathy (4.72), mechanical ventilation (1.89), inotropes (3.77), cardiac arrest (2.83), LMD (0.94), The most common complication after one month was new MI (another vessel or stent thrombosis) (4.72%), new PCI (including new MI and another critical vessel; 15.09%), referred for CABG (post-intervention for culprit's vessel; 3.77%), stroke (0.94%), hospitalization for any reason (20.75%). The rate of heart failure was 36.79% with different degrees. The incidence of hematoma was 24.53% including different lengths. Only three patients required blood transfusion (2.83%). The mean hour of hospital stay was 16.82 hrs. Most of the patients stayed <24 hrs. at the hospital (82.08%) compared to 17.93% who stayed ≥24 hrs. at the hospital. The study showed that only 4 patients died; including two at the hospital and two outside the hospital. The following complications were not found among patients with STEMI who received a primary PCI, systemic embolism, pulmonary embolism, perforation, and tamponade (**Table 7**).

Table 1. General information of patients with STEMI received primary PCI

Characteristics (n=106)		No.	%
Age groups	31-40	3	2.83
	41-50	29	27.36
	51-60	33	31.13
	61-70	29	27.36
	71-80	12	11.32
Sex	Male	88	83.02
	Female	18	16.98
BMI	Underweight	1	0.94
	Normal weight	19	17.93
	Overweight	35	33.02
	Obese	51	48.11
Smoking	Yes	58	54.72
	Ex-smoker	12	11.32
	Non-smoker	36	33.96
Age (37-78 years) mean (SD) is 57.69 (10.1). BMI (17.53-41.44) mean (SD) is 29.54 (4.71)			

Table 2. Symptoms and risk factors of patients with STEMI received primary PCIU

Symptoms and risk factors (n=106)		No	%
Symptoms	Chest pain	105	99.06
	Dyspnea	36	33.96
	Sweating	76	71.70
	Nausea	66	62.26
	Vomiting	42	39.62
	Epigastric pain	19	17.92
	Back pain	15	14.15
	Jaw pain	7	6.60
	Syncope	10	9.43
	Arrest	7	6.60
	VT	10	9.43
	Shoulder pain	4	3.77
Risk factors	Hypertension	64	60.38
	DM	53	50.00
	Dyslipidemia	43	40.57
	FH of CAD	35	33.02
	CKD	4	3.77
	Chemotherapy	1	0.94
	STROKE/TIA	4	3.77
	MI	19	17.92
	PCI	22	20.75
	RA	2	1.89
	CABG	3	2.83

Table 3. ECG findings of patients with STEMI received primary PCI

ECG findings (n=106)		No.	%
Anteroseptal		14	13.21
Anterolateral		8	7.55
Extensive anterior		30	28.30
lateral		11	10.38
High lateral		3	2.83
Inferior		45	42.45
infero-posterior		9	8.49
Posterior		1	0.94
New/presumed new LBBB		2	1.89
Cardiogenic shock		1	0.94
Intubation		1	0.94
Pre-PCI EF*	Preserved	81	76.42
	Impaired	25	23.58
Post PCI EF**	Preserved	81	76.42
	Impaired	25	23.58
Arrival in Hours	<2 hrs	29	27.36
	≥ 2 hrs	77	72.64
Management in hours	<2 hrs.	90	84.91
	≥ 2 hrs	16	15.09
Total delay in hours	<2 hrs.	9	8.49
	≥ 2 hrs	97	91.51

**Pre-PCI EF (24-70%) mean (SD) is 53.71 (5.65).*

***Post PCI EF Range:(35-76%) mean (SD) is 57.20 (3.94).*

There was no anterior + posterior findings

Table 4. Lab results of patients with STEMI received primary PCI

Lab results n=106	Mean	SD	Range
HS TN	0.07	0.05	0.003 - 10
CK-MB	4.46	2.72	0.67 - 300
HS CRP	0.72	0.48	0.02 - 53.37
HBA1C	5.94	0.57	4.61 - 13.78
HB	15.1	0.97	9.7 - 18.5
WBC	9.70	1.62	1.5 - 22.3
RBS	143.3	24.59	18 - 502
S.CR	0.89	0.23	0.39 - 10.8
B. UREA	37.58	8.33	18 - 134

An independent t-test was performed for statistical analyses. The red bold numbers show the significant differences.
SD: standard deviation

Table 5. Angiographic findings of patients with STEMI received primary PCI

Angiographic findings (n=106)		No.	%
Dominancy	Co-dominant	4	3.77
	Left	23	21.7
	Right	79	74.53
Type of lesion	B1	6	5.66
	B2	22	20.76
	C	78	73.59
LMS		106	100
LAD		51	48.11
LCX		12	11.32
RCA		37	34.91
Diagonal		2	1.89
OM		4	3.77
RAMUS		1	0.94
PDA		106	100
PLV		1	0.94
Graft	No graft	104	98.11
	LIMA	1	0.94
	SVG	1	0.94
TIMI Flow	0	66	62.26
	1	1	0.94
	2	8	7.55
	3	31	29.25
Segment	Distal	11	10.38
	MID	34	32.08
	Ostium	2	1.89
	Proximal	59	55.66
ISR		10	9.43
Stent thrombosis		1	0.94
Denovo injury		8	7.55
Slow flow		26	25
Lesion length	<10 mm	3	2.83
	10-20 mm	26	24.53
	>20 mm	77	72.64

Table 5. …. Continued , Angiographic findings of patients with STEMI received primary PCI

Angiographic findings (n=106)		No.	%
Angle	Non-angulated	86	81.13
	Moderately angulated	20	18.87
Contour	Irregular contour	93	87.74
	Smooth contour	13	12.26
Calcification	None	31	29.25
	Mild	42	39.62
	Moderate	26	24.53
	Severe	7	6.6
Occlusion	Intermediate	1	0.94
	Critical	4	3.77
	Sub-total	36	33.96
	Total	65	61.32
OSTIAL lesion		40	37.74
Involvement Major branch		99	93.4
TIMI TG	0	18	16.98
	1	15	14.15
	2	10	9.43
	3	16	15.09
	4	30	28.3
	5	17	16.04
Bifurcation lesion		37	34.91
Tortuosity		23	21.7
Major side branch		5	/4.72
Vein graft		2	1.89
No. of vessels	SVD	31	29.25
	DVD	48	45.28
	TVD	25	23.59
	TVD plus left main	2	1.89

Table 6. Primary PCI findings of patients with STEMI

PCI findings (n=106)		No.	%
Access route	Femoral	102	96.23
	Radial	4	3.77
PCI type	Balloon angioplasty	8	7.55
	Balloon passing through	1	0.94
	Direct stent implantation	34	32.08
	Stenting post-dilation	63	59.43
Stent No.	0	6	5.66
	1	80	75.47
	2	20	18.87
Non-culprit		4	3.77
PCI result	Successful	105	99.06
	Failed	1	0.94
Medication	None	93	87.74
	GPIIB/IIIA	13	12.26

Stent total length (mm) 10-62 mm is 31.04 (11.52).

Table 7. Complications of patients with STEMI received primary PCI at hospital

Complications (n=106)		No.	%
Dissection		6	5.66
Embolization		22	20.75
Slow flow		31	29.24
No reflow		6	5.66
Stent thrombosis		2	1.89
Arrhythmia		6	5.66
Cardiogenic shock		4	3.77
IABP		1	0.94
Temporary pm		1	0.94
Dialysis		1	0.94
Contrast nephropathy		5	4.72
Mechanical ventilation		2	1.89
Inotropes		4	3.77
Cardiac arrest		3	2.83
LMD		1	0.94
New MI		5	4.72
NEW PCI		16	15.09
Referred for CABG		4	3.77
Stroke		1	0.94
Hospitalization		22	20.75
Heart failure	0	67	63.21
	1	12	11.32
	2	17	16.04
	3	5	4.72
	4	5	4.72
Hematoma	None	80	75.47
	<10 cm	22	20.76
	≥10 cm	4	3.77
Blood transfusion		3	2.83
Hospital stay*	<24 hrs.	87	82.08
	≥24 hrs.	19	17.93
Outcome	Alive	102	96.23
	In-hospital death	2	1.89
	out-hospital death	2	1.89
COVID-19		5	4.72

**Hospital stay (range: 5-168 hr.) mean (SD) is 16.82 (5.02).*

None of the cases had Perforation, Tamponade , Systemic embolism or Pulmonary embolism

4. DISCUSSION

The most relevant findings in this study demonstrated that most of the patients presented with STEMI are obese and smokers. Chest pain was the most prevalent symptom and smoking and hypertension were the most prevalent risk factors among STEMI patients. The ECG findings of the patients revealed that the ST elevation mostly belonged to the inferior (42.45%) pattern followed by extensive anterior, anteroseptal, lateral, inferior-posterior, and anterolateral patterns. The study reported approximately a quarter of patients had impaired EF before and after PCI. The angiographic findings of STEMI patients regarding dominancy profile were disclosed the right dominant in (74.53%); left dominant in (21.70) and co-dominant in (3.77). The most prevalent culprit coronary was LAD (proximal segment). Most of the patients had grade 0 of TIMI (62.26%) followed by grade 3. The study found that 9.43% of the patients had gradual re-narrowing of a stented coronary artery lesion (ISR). The lesion lengths were mostly >20 mm followed by 10-20 mm, and <10 mm, and mostly were non-angulated and had irregular contours. The study found that 39.62% had mild calcification followed by moderate (24.53%) and severe (6.60%) and most patients had total occlusion. The patients had minor complications only four patients died and one patient failed PCI. The older patients and impaired ejection fraction were more likely to develop heart failure compared to younger age groups. The studies conducted in this region have reported similar findings to this study. A study conducted in the Duhok governorate (Kurdistan Region) aimed to explore the characteristics and 6-week outcomes of STEMI patients following PPCI (5). They reported that a third of patients had elevated cTn. The patients with high cTn had a higher rate of prior CABG and other escalated medical conditions. The role of cTn is outside the scope of this study, but this study showed that a higher level of high-sensitive cTn is associated with higher rates of developing heart failure after PPCI. However, in well-matched with the findings of this study, it was reported that minor myocardial injury following PCI is common and is related to procedural complexity and stratified patients at risk of worse prognosis (8). In this regard, obese patients and smokers were more likely to develop heart failure after PPCI. Also, we found some minor complications after PPCI including coronary dissection, embolization, slow flow, no-reflow, stent thrombosis, arrhythmia, cardiogenic shock, intra-aortic balloon pump insertion,

temporary pacemaker insertion, dialysis, contrast nephropathy, mechanical ventilation, inotropes, cardiac arrest, left main disease, new MI, new PCI, referred for CABG, stroke, and hospitalization. The rates of these complications are low and mostly associated with comorbidities and prior cardiac interventions. Nonetheless, and more importantly, the rate of mortality was relatively low and only one patient had failed PCI despite most of the patients having grade three lesion and total occlusion with higher rates of comorbidities and despite other risk factors. In agreemnt with the current study, Mohammad et al. (5) reported that most of the patients with STEMI are older and the majority are males. The patients in this study were mostly aged 41 to 70 years old. In addition, in this study, these patients were more likely to develop other complications like heart failure. The systematic reviews have approved that despite PCI being a safe and effective procedure for myocardial perfusion, patients with advanced age were more likely to develop vascular compilations and have a higher risk for acute coronary diseases (9). Bauer & Zeymer approved that peri-procedural mortality risk following PCI confirms a curvilinear link with age. Higher rates of mortality are found among older patients. But the magnitude of the risk of mortality rate depends on several other factors such as angiographic and procedural factors. The overall mortality among STEMI was slightly lower than reported by Mohammad et al. (5), 3.78 vs. 5%, respectively. The difference may back to several medical, epidemiological, and clinical characteristics. Their outcomes were found to be predicted by the type or location of MI, the culprit artery, TIMI flow post PCI, and length of hospital stay. We did not examine the associated factors to mortality in this study because the mortality was somehow low to perform the statistical analyses. Interestingly a study aimed to examine the clinical and perioperative characteristics of patients ≥ 75 who received PCI. In addition, they aimed to examine the risk factors of short-term mortality following PCI (10). In this regard, they categorized 1,035 patients who received PCI between 2011 and 2013 into the following age groups. The age groups were (1) patients with stable angina (SA) ≥ 75 years; (2) patients with SA < 75 years; (3) patients with acute coronary syndrome (ACS) ≥ 75 years; (4) patients with ACS < 75 years. They reported that compared to the patients in younger age groups, patients ≥ 75 years were more likely to be hypertensive, with a history of stroke, COPD, peripheral vascular disease, cardiogenic shock, and malignant arrhythmia. In addition, they were more

likely to be admitted to the hospital with relative lower weight, hemoglobin, albumin, triglyceride, higher creatinine, uric acid, urea nitrogen, and pro-BNP. In addition, elderly patients were more likely to have left main artery lesions, multi-vessel, calcified lesions, and chronic total occlusion. Importantly the univariate analysis showed that the following factors are associated with six-month mortality in elderly patients ≥ 75 years who underwent PCI; cardiogenic shock or severe arrhythmia at admission, emergency PCI, prior stroke, and chronic kidney disease 10. But it is important to mention that performing PCI on the elderly is recommended by systematic reviews (11). In terms of the role of age on heart failure, studies have reported that aging leads to an increase in cardiovascular disease and a decrease in cardiac reserve at the same time (12). In general, we can say that the PCI is an effective and safe procedure for STEMI patients of different age groups and genders. In addition, this study showed that it is effective and safe for STEMI patients with more escalated medical conditions; such as occlusion, flow, and other angiographic findings (13-16).

5. CONCLUSIONS

This study showed that primary PCI has low rates of complications in patients with STEMI. It has a low rate of mortality and failure. But the older patients and smokers were more likely to develop after PCI compilations.

Ethical Approval:

All ethical issues were approved by the author. Data collection and patients enrollment were in accordance with Declaration of Helsinki of World Medical Association , 2013 for the ethical principles of researches involving human. Signed informed consent was obtained from each participant and data were kept confidentially.

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6. BIBLIOGRAPHY

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