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Clinical Characteristic, In-Hospital and Short Term Outcomes in Patients with Acute Coronary Syndrome

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Abstract

***Background**: The acute coronary syndrome is common public health burden and first cause of mortality all over the world. The percutaneous coronary intervention and thrombolytic therapy are the best management of patients with acute coronary syndrome.*
***Aim of study**: To evaluate the clinical characteristics, in-hospital and short term outcomes in patients with acute coronary syndrome.*
Patients & methods: A prospective cross sectional study that carried out in Erbil Cardiac center in Erbil city-Kurdistan region/Iraq through duration period of six months from first of January to 30th of June, 2022 on sample of two hundred patients with acute coronary syndrome. The diagnosis of ACS was done by senior house officer in coronary care unit at the time of admission under recommendation of national and international Guidelines.
***Results**: The STEMI cases were detected in 80% of patients, while NSTEMI cases were detected in 20% of patients. Short term outcomes of ACS were CABG (0.5%), stroke (1.5%), hospitalization (7.5%), HF (6%), hematoma (2.5%), blood transfusion (1%), long hospital stay (17%), death (3.5%) which classified to in-hospital death (1.5%) and death within 30 days (2%). The mean left ventricular ejection fraction of ACS patients was significantly increased after implementing percutaneous coronary intervention (p=0.002).*
***Conclusions**: The clinical characteristics of patients with acute coronary syndrome are comparable to other literatures, while in-hospital short term outcomes are better than previous national literatures.*

***Keywords**: Acute coronary syndrome, STEMI, NSTEMI, In-hospital short term outcomes*

1. INTRODUCTION

The acute coronary syndrome (ACS) is a constellation of clinical symptoms and signs resulted from occluded coronary artery attributed to thrombi caused by atherosclerotic plaque rupture [1]. The ACS involves unstable angina (UA), ST-segment elevation myocardial infarction (STEMI) and non-STEMI (NSTEMI) [2]. The risk factors of ACS are modifiable factors such as diabetes mellitus, hypertension, abnormal lipid profile, obesity, smoking and a physical inactivity, age, gender, genetic predisposition, race and a low socioeconomic level are the common non-modifiable risk factors of ACS [3]. In spite of fundamental advancement in diagnosis and treatment of ACS, the cardiovascular disorders is still the common cause of mortality all over the world and about 50% of these mortalities are related to ACS [4, 5]. Additionally, the ACS is responsible for about 12% of disability per year worldwide [5-7]. Globally, there was a significant difference in revascularization and long-term mortality outcome rates after ACS [8-10]. Lower incidence rates are reported for STEMI in developed communities[11], due to decreasing burden of common risk factors like smoking in population of these communities and also due to increasing use of high-sensitivity troponin (hsTn) assays in diagnosis non-STEMI (NSTEMI) [10]. However, the in-hospital mortality rates of STEMI are still high in developed centers especially if deteriorated to shock and cardiac arrest [10]. Lifestyle modernization, technological development and high office opportunities in developing countries accelerated incidence rates of ACS with proved epidemiological transition [12]. Elevated mortality and disability rates of cardiovascular diseases in developing countries are similar to reduction rates of infections which made them as the common next public health challenge in these countries [13].

Exact pathophysiology of ACS is concentrated in low blood flow reaching cardiac muscles caused by plaque rupture and thrombus formation. However, in some cases, the ACS is secondary to vasospasm. Common ACS symptom is chest pain, however, some cases presented by dyspnea, headache, nausea, epigastric pain, and generalized weakness. Risk factors like elderly age, female gender and diabetes mellitus must be taken in consideration in clinical diagnosis of ACS. Electrocardiography (ECG) evaluation is the common investigative tool in diagnosis of ACS and differentiation between STEMI, NSTEMI and unstable angina [14].

Percutaneous coronary intervention (PCI) should be applied in cases of STEMI as soon as possible. The cardiac enzymes specifically troponin, creatine kinase (CK)-MB are useful in assessment of NSTEMI [14]. Other investigations are also required like chest x-ray complete blood count, liver function test and renal function test [16].

The management of ACS is concentrated on restoring coronary perfusion through PCI and thrombolytic therapy (fibrinolysis). However, this intervention is dependable on ACS clinical presentation [17]. Recently, many guidelines by different medical societies in Europe and the United States of America aimed in improving treatment originally developed guidelines and ameliorating the ACS outcomes by implementing these guidelines clinically [2, 18, 19]. Different systematic large registries and systematic meta-analysis studies provide valuable evidences regarding ACS [20, 21], especially demographic characteristics, management and outcomes of ACS in developed and developing countries, although little researches are published on patients with ACS in developing countries [21]. Furthermore, many authors revealed that epidemiology, clinical characteristics and treatment ACS are various in different countries, with large gap between guidelines and current clinical practices [22, 23]. Moreover, some large studies showed scientific facts different from real existing findings of ACS [23]. Consequently, the developing countries need further literatures in order to increase awareness of population regarding clinical characteristics and management of ACS, which help in establishing suitable preventive and treatment plans [24].

In Iraq, the epidemiological transition from infectious diseases to non-communicable diseases specifically cardiovascular diseases was obvious after 2003 with improvement of economic situation and changes in lifestyles in Iraq and Kurdistan region [25]. The world Health Organization (WHO) reported that coronary artery diseases are responsible of 18.5% of total mortalities in Iraq [26]. Although this increase in incidence and mortality of ACS in Iraq and Kurdistan, there is a scarcity and paucity data regarding clinical characteristics and in-hospital short outcomes of ACS. For that, this study aimed to evaluate the clinical characteristics, in-hospital and short term outcomes in patients with acute coronary syndrome.

2. METHODOLOGY

The current study design was a prospective cross sectional study that carried out in Erbil Cardiac center in Erbil city-Kurdistan region/Iraq through duration period of six months from first of January to 30th of June, 2022. The study population was all patients with acute coronary syndrome admitted to Erbil Cardiac center during study duration. Adult patients (age 20-93 years) with clinical symptoms and signs of acute coronary syndrome (STEMI, NSTEMI and unstable angina) that confirmed by ECG and laboratory findings were the inclusion criteria. Exclusion criteria were younger age patients, patient who are not met with criteria of ACS, patient with previous attack of ACS and patients refused to participate. The ethical considerations were implemented according Helsinki Declaration regarding ethical approval of Health authorities; an ethical approval was taken from Kurdistan Board Ethical Committee, oral informed consent of patients and responsibility in management of patients with complications. A convenient sample of two hundred patients with acute coronary syndrome was selected after eligibility to inclusion and exclusion criteria.

The data were collected by from patients directly or from their relatives and fulfilled in a prepared questionnaire. The questionnaire was designed by the researchers. The questionnaire included the following information: general characteristics of ACS patients (age, gender and body mass index), ACS symptoms, risk factors of ACS (smoking, diabetes mellitus, hypertension, dyslipidemia, family history of coronary artery disease, prior PCI and prior CABG), Electrocardiography findings of ACS patients (ECG findings, abnormal ECG findings like Anterioseptal [V1-V4], Extensive anterior [V1-V5 or V6], Inferior [II, III, aVF] investigations done for ACS patients (LVEF pre and post PCI, High sensitivity troponin, Creatine Kinase MB, HbA1c level, WBC count, RBS, serum creatinine, blood urea, total cholesterol and LDL levels) PCI characteristics and complications during admission of ACS patients (access route, plan of management, PCI type, PCI results, dissection, no reflow, stent thrombosis, arrhythmia, cardiogenic shock and contrast nephropathy) and short term outcome of ACS patients (CABG, stroke, hospitalization, heart failure, hematoma, blood transfusion, hospital stay duration and death). The diagnosis of ACS was done by senior house officer in coronary care unit at the time of admission under recommendation of ESC &

ACC guidelines. PCI done in Erbil cardiac center depend on recommendation of ESC & ACC guidelines and all investigation done in Erbil cardiac center.

The outcomes of ACS patients were assessed by responsible physician in the center through frequent examinations and follow up. The patients were followed up from their admission to one month after discharge through frequent visits and/or by phone calling.

The data collected were analyzed statistically by Statistical Package of Social Sciences software version 22. The chi-square and Fishers exact tests were applied for analyzing categorical variables. Level of significance (p value) was regarded statistically significant if it was 0.05 or less.

3. RESULTS

This study included two hundred patients with acute coronary syndrome (ACS) admitted with mean age of (58.7 years) and range of 27-90 years; 3.5% of ACS patients were in age group <40 years and 19.5% of them were in age group of 70 years and more. Male ACS patients were more than females with male to male ratio of 3:1. The mean BMI of ACS patients was (29.7 Kg/m2); 46% of ACS patients were overweight and 45.5% of them were obese. (**Table 1**)

The most common clinical symptom of ACS was chest pain (100%), followed by; sweating (98%), nausea (95%), dyspnea (20.5%), vomiting (13.5%), jaw pain (13.5%), back pain (1.5%), abdominal pain (1%) and syncope (1%). (**Table 2**)

The main risk factors of ACS were hypertension (47%), smoking (43.5%), diabetes mellitus (33.5%), family history of coronary artery disease (21.5%), dyslipidemia (6%), prior CABG (2%) and prior PCI (0.5%), (Table 3).

The ECG was abnormal in 91% of ACS patients; common abnormal ECG findings were; inferior (II, III, aVF) in 32% of ACS patients, anterioseptal (V1-V4) in 21.5% of patients, anteriolateral (V4-V6, I, aVL) in 10% of patients, T-wave inversion in 7.5% of patients and ST-depression in 7% of them. The STEMI ACS was detected in 80% of patients, while NSTEMI ACS was detected in 20% of patients. (**Table 4**)

Low LV EF was reported in 18.5% of ACS patients before PCI, while low LV EF was reported in 16.5% of ACS patients one month after PCI. The investigations revealed high HS-TN in 4% of patients, high CK-MB in 40.5% of patients, high HbA1c level in 21% of patients, anemia in 9%

of ACS patients, high WBC count in 20% of ACS patients, high RBS in 24.5% of patients, high serum creatinine in 6.5% of patients, high blood urea in 99.5% of patients, high total cholesterol in 16% of patients and high LDL in 18% of them, (**Table 5**).

All ACS patients had femoral access route, PCI management with direct stent implantation type and ended with successful PCI. The main complications on admission were arrhythmia (12%), dissection (6%), stent thrombosis (3.5%), cardiogenic shock (2.5%), etc., (**Table 6**)

Short term outcomes of ACS were CABG (0.5%), stroke (1.5%), hospitalization (7.5%), HF (6%), hematoma (2.5%), blood transfusion (1%), long hospital stay (17%), death (3.5%) which classified to in-hospital death (1.5%) and death within 30 days (2%), (**Table 7**).

The mean left ventricular ejection fraction of ACS patients was significantly increased after implementing percutaneous coronary intervention (p=0.002), (**Table 8**). No significant differences were observed between ACS patients with STEMI and ACS patients with NSTEMI regarding age (p=0.9), gender (p=1.0) and body mass index of patients (p=0.6), (**Table 9**).

No significant differences were observed between ACS patients with STEMI and ACS patients with NSTEMI regarding dyspnea (p=0.9), sweating (p=0.8), nausea (p=1.0), vomiting (p=0.75), back pain (p=0.38), jaw pain (0.75) and syncope (p=0.47). A significant association was observed between abdominal pain and ACS patients with NSTEMI (p=0.004), (**Table 10**)

No significant differences were observed between ACS patients with STEMI and ACS patients with NSTEMI regarding smoking (p=0.39), HT (p=0.77), DM (p=0.6), dyslipidemia (p=0.76), family history of CAD (p=0.14) and prior CABG (p=0.13). A significant association was observed between prior PCI and ACS patients with NSTEMI (p=0.04), (**Table 11**)

No significant differences were observed between ACS patients with STEMI and ACS patients with NSTEMI regarding pre-PCI LV-EF (p=0.12), HS-TN (p=0.14), CK-MB (p=0.42), HbA1c (p=0.25), WBC (p=0.37), RBS (0.74), serum creatinine (p=0.66), blood urea (p=0.61), total cholesterol (p=0.2) and LDL (p=0.19). The post-PCI LVEF was significantly lower in patients with STEMI (p=0.02). A significant association was observed between anemia and ACS patients with STEMI (p=0.02), (**Table 12**)

No significant differences were observed between ACS patients with STEMI and ACS patients with NSTEMI regarding CABG (p=0.6), stroke (p=0.5), hospitalization (p=0.5), heart failure

(p=0.07), hematoma (p=0.25), blood transfusion (0.47), hospital stay duration (p=0.7), death (p=0.7), in-hospital death (p=0.38) and death within 30 days (p=0.8), (**Table 13**).

A significant association was observed between smoking and male ACS patients (p=0.001). No significant differences were observed between male and female ACS patients regarding HT (p=0.07), DM (p=0.06), dyslipidemia (p=0.49), family history of CAD (p=0.48), prior PCI (p=0.56) and prior CABG (p=0.24), (**Table 14**)

Table 1. General characteristics of ACS patients.

Variable		**No.**	**%**
Age (year)	<40	7	3.5
	40-49	33	16.5
	50-59	70	35
	60-69	51	25.5
	≥70	39	19.5
	Mean (SD): 58.7 (11.1)		
Gender	Male	150	75
	Female	50	25
BMI	Normal	17	8.5
	Overweight	92	46
	Obese	91	45.5
	Mean (SD): 29.7 (3.1) Kg/m^2		

SD: standard deviation of mean

Table 2. Distribution of ACS symptoms of the studied group.

Symptom	**No.**	**%**
Chest pain	200	100.0
Sweating	196	98.0
Nausea	190	95.0
Dyspnea	41	20.5
Vomiting	27	13.5
Jaw pain	27	13.5
Back pain	3	1.5
Abdominal pain	2	1.0
Syncope	2	1.0

Table 3. Risk factors of ACS.

Risk factor	Yes		No	
	No.	%	No.	%
Smoking	87	43.5	113	56.5
HT	94	47	106	53
DM	67	33.5	133	66.5
Dyslipidemia	12	6	188	94
Family history of CAD	43	21.5	157	78.5
Prior PCI	1	0.5	199	99.5
Prior CABG	4	2	196	98

Table 4. ECG finding of ACS patients.

Variable	No.	%
ECG		
Normal	18	9
Abnormal	182	91
Abnormal ECG findings		
Anterioseptal (V1-V4)	43	21.5
Extensive anterior (V1-V5 or V6)	17	8.5
Inferior (II, III, aVF)	64	32
Posterior	7	3.5
New/Presumed new LBB	3	1.5
Anteriolateral (V4-V6, I, aVL)	20	10
Lateral (V4-V6)	5	2.5
Infero-posterior (II, III, Avf+Posterior)	6	3
ST depressions	14	7
T-wave inversions	15	7.5
Transient ST elevations	2	1
ACS types		
STEMI	160	80
NSTEMI	40	20

Table 5. Investigations findings of ACS patients.

Variable	No.	%
Pre-PCI LVEF		
Normal	163	81.5
Low	37	18.5
Post-PCI LVEF		
Normal	167	83.5
Low	33	16.5
High sensitivity troponin		
Normal	192	96.0
High	8	4.0
Creatine Kinase MB		
Normal	119	59.5
High	81	40.5
HbA1c level		
Normal	158	79.0
High	42	21.0
Hemoglobin level		
Normal	182	91.0
Anemic	18	9.0
White blood cells count		
Normal	160	80.0
High	40	20.0
Random blood sugar		
Normal	151	75.5
High	49	24.5
Serum creatinine		
Normal	187	93.5
High	13	6.5
Blood urea		
Normal	1	0.5
High	199	99.5
Total cholesterol		
Normal	168	84.0
High	32	16.0
LDL level		
Normal	164	82.0
High	36	18.0

Table 6. Complications of PCI during admission of ACS patients.

Variable	No.	%
Access route , Femoral	200	100.0
Plan of management , PCI	200	100.0
PCI type, Direct stent implantation	200	100.0
Results of PCI, Successful	200	100.0
Arrhythmia	24	12.0
Dissection	12	6.0
Stent thrombosis	7	3.5
Cardiogenic shock	5	2.5
No reflow	1	0.5
Contrast nephropathy	1	0.5

Table 7. Short term outcome of ACS patients.

Variable	Yes		No	
	No.	%	No.	%
CABG	1	0.5	199	99.5
Stroke	3	1.5	197	98.5
Heart failure	12	6.0	188	94.0
Hematoma	5	2.5	195	97.5
Blood transfusion	2	1.0	198	99.0
Hospitalization	15	7.5	185	92.5
Hospital stay duration				
≤24 hours	166	83.0	-	-
>24 hours	34	17.0	-	-
Death	7	3.5	193	96.5
In-hospital death	3	1.5	197	98.5
Death within 30 days	4	2.0	196	98.0

Table 8. Left ventricular ejection fraction of ACS patients before and after PCI.

Study period	LV-EF (%)	
	Mean	SD
Pre-PCI	53.89	6.94
Post-PCI	54.75	7.12
P. value = 0.002 significant		

SD: standard deviation of mean

Table 9. Distribution of patients' general characteristics according to ACS types.

Variable		STEMI		NSTEMI		P
		No.	%	No.	%	
Age (year)	<40	6	3.8	1	2.5	
	40-49	26	16.3	7	17.5	
	50-59	55	34.4	15	37.5	0.9 NS
	60-69	40	25	11	27.5	
	≥70	33	20.6	6	15	
Gender	Male	120	75	30	75	1.0 NS
	Female	40	25	10	25	
Body mass index	Normal	14	8.8	3	7.5	
	Overweight	76	47.5	16	40	0.6 NS
	Obese	70	43.8	21	52.5	

NS: Not significant.

Table 10. Distribution of clinical symptoms according to ACS types.

Variable		STEMI		NSTEMI		P
		No.	%	No.	%	
Dyspnea	Yes	33	20.6	8	20	0.9 NS
	No	127	79.4	32	80	
Sweating	Yes	157	98.1	39	97.5	0.8 NS
	No	3	1.9	1	2.5	
Nausea	Yes	152	95	38	95	1.0 NS
	No	8	5	2	5	
Vomiting	Yes	21	13.1	6	15	0.75 NS
	No	139	86.9	34	85	
Abdominal pain	Yes	0	-	2	5	0.004 S
	No	160	100	38	95	
Back pain	Yes	3	1.9	0	-	0.38 NS
	No	157	98.1	40	100	
Jaw pain	Yes	21	13.1	6	15	0.75 NS
	No	139	86.9	34	85	
Syncope	Yes	2	1.3	0	-	0.47 NS
	No	158	98.8	40	100	

S: Significant, NS: Not significant.

Table 11 Distribution of risk factors according to ACS types.

Risk factor		STEMI		NSTEMI		P
		No.	%	No.	%	
Smoking	Yes	72	45.0	15	37.5	0.39 NS
	No	88	55.0	25	62.5	
Hypertension	Yes	76	47.5	18	45.0	0.77 NS
	No	84	52.5	22	55.0	
Diabetes mellitus	Yes	55	34.4	12	30.0	0.6 NS
	No	105	65.6	28	70.0	
Dyslipidemia	Yes	10	6.3	2	5.0	0.76 NS
	No	150	93.8	38	95.0	
Family history of CAD	Yes	31	19.4	12	30.0	0.14 NS
	No	129	80.6	28	70.0	
Prior PCI	Yes	0	-	1	2.5	0.04 S
	No	160	100.0	39	97.5	
Prior CABG	Yes	2	1.3	2	5.0	0.13 NS
	No	158	98.8	38	95.0	

S: Significant, NS: Not significant.

Table 12. Distribution of investigations findings according to ACS types.

Variable		STEMI		NSTEMI		P
		No.	%	No.	%	
Pre-PCI LV EF	Normal	127	79.4	36	90.0	0.12 NS
	Low	33	20.6	4	10.0	
Post-PCI LV EF	Normal	129	80.6	38	95.0	0.02 S
	Low	31	19.4	2	5.0	
High sensitivity troponin	Normal	152	95.0	40	100.0	0.14 NS
	High	8	5.0	0	-	
Creatine Kinase MB	Normal	93	58.1	26	65.0	0.42 NS
	High	67	41.9	14	35.0	
HbA1c level	Normal	129	80.6	29	72.5	0.25 NS
	High	31	19.4	11	27.5	
Hemoglobin level	Normal	142	88.8	40	100.0	0.02 S
	Anemic	18	11.3	0	-	
WBC count	Normal	126	78.8	34	85.0	0.37 NS
	High	34	21.3	6	15.0	
Random blood sugar	Normal	120	75.0	31	77.5	0.74 NS
	High	40	25.0	9	22.5	
Serum creatinine	Normal	149	93.1	38	95.0	0.66 NS
	High	11	6.9	2	5.0	
Blood urea	Normal	1	0.6	0	-	0.61 NS
	High	159	99.4	40	100.0	
Total cholesterol level	Normal	137	85.6	31	77.5	0.2 NS
	High	23	14.4	9	22.5	
LDL level	Normal	134	83.8	30	75.0	0.19 NS
	High	26	16.3	10	25.0	

S: Significant, NS: Not significant.

Table 13. Distribution of short term outcomes according to ACS types.

Variable		STEMI		NSTEMI		P
		No.	%	No.	%	
CABG	Yes	1	0.6	0	-	0.6 NS
	No	159	99.4	40	100.0	
Stroke	Yes	2	1.3	1	2.5	0.5 NS
	No	158	98.8	39	97.5	
Hospitalization	Yes	13	8.1	2	5.0	0.5 NS
	No	147	91.9	38	95.0	
Heart failure	Yes	12	7.5	0	-	0.07 NS
	No	148	92.5	40	100.0	
Hematoma	Yes	3	1.9	2	5.0	0.25 NS
	No	157	98.1	38	95.0	
Blood transfusion	Yes	2	1.3	0	-	0.47 NS
	No	158	98.8	40	100.0	
Duration of Hospital stay	≤24 hours	132	82.5	34	85.0	0.7 NS
	>24 hours	28	17.5	6	15.0	
Death	Yes	6	3.8	1	2.5	0.7 NS
	No	154	96.3	39	97.5	
In-hospital death	Yes	3	1.9	0	-	0.38 NS
	No	157	98.1	40	100.0	
Death within 30 days	Yes	3	1.9	1	2.5	0.8 NS
	No	157	98.1	39	97.5	

NS: Not significant.

Table 14. Distribution of risk factors according to gender of ACS patients.

Variable		Male		Female		P
		No.	%	No.	%	
Smoking	Yes	75	50.0	12	24.0	0.001 S
	No	75	50.0	38	76.0	
Hypertension	Yes	65	43.3	29	58.0	0.07 NS
	No	85	56.7	21	42.0	
Diabetes mellitus	Yes	45	30.0	22	44.0	0.06 NS
	No	105	70.0	28	56.0	
Dyslipidemia	Yes	10	6.7	2	4.0	0.49 NS
	No	140	93.3	48	96.0	
Family history of CAD	Yes	34	22.7	9	18.0	0.48 NS
	No	116	77.3	41	82.0	
Prior PCI	Yes	1	0.7	0	-	0.56 NS
	No	149	99.3	50	100.0	
Prior CABG	Yes	2	1.3	2	4.0	0.24 NS
	No	148	98.7	48	96.0	

NS: Not significant.

4. DISCUSSION

In current study, most common clinical symptom of ACS was chest pain (100%), followed by; sweating (98%), nausea (95%), dyspnea (20.5%), etc. These clinical symptoms are similar to results of Birnbach et al [2] study in Germany. Our study showed that main risk factors of ACS were hypertension (47%), smoking (43.5%), diabetes mellitus (33.5%), family history of coronary artery disease (21.5%), etc. Consistently, Hajar study [28] in Qatar stated that hypertension, diabetes mellitus and smoking are the common risk factors of acute coronary syndrome. In our study, the ECG was abnormal in 91% of ACS patients; common abnormal ECG findings were; inferior (II, III, aVF) in 32% of ACS patients, anterioseptal (V1-V4) in 21.5% of patients, anteriolateral (V4-V6, I, aVL) in 10% of patients, etc. These findings are in agreement with results of Birnbaum et al [29] review study in United States which stated that ECG provide snapshot picture on electricity of heart that firstly affected by ACS. Our study revealed that STEMI was detected in 80% of patients, while NSTEMI was detected in 20% of patients. These proportions are different from Khaznadar and Salh cross sectional study [30] in Sulaimani city-Kurdistan region/Iraq which reported that STEMI represented 50.4% of ACS cases and NSTEMI represented 49.6% of them. This inconsistency might be attributed to differences in methodology and inclusion criteria between two studies.

In present study, all ACS patients were subjected to PCI and mean left ventricular ejection fraction of ACS patients was significantly increased after implementing PCI (p=0.002). Similarly, Mukherjee et al [31] retrospective study in United States found that LVEF of ACS patients was significantly increased after PCI and low LVEF was a significant predictor of in-hospital mortality. The main short term outcomes of ACS were CABG (0.5%), stroke (1.5%), hospitalization (7.5%), HF (6%), hematoma (2.5%), blood transfusion (1%) and long hospital stay (17%). These findings are close to results of Al-Murayeh et al [32] study in Saudi Arabia and Yaakoubi et al [33] study in Tunisia which all documented that short term outcomes concentrated on long hospital stay, heart failure and hematoma. Our study found that death occurred in 3.5% of ACS patients which classified to in-hospital death (1.5%) and death within 30 days (2%). These findings are better than results of Mohammad et al [34] single center cross sectional study in Duhok city-Kurdistan region/Iraq which reported that 1st 24 hours in-hospital mortality rate of ACS patients was (5.8%). This difference might be due to

fact that our center is a tertiary center of Kurdistan region and the effect of earlier PCI implemented in our study patients.

The present study found a significant association between abdominal pain and ACS patients with NSTEMI (p=0.004). This finding coincides with results of Kim et al [35] study in South Korea which reported that atypical symptoms of ACS like abdominal pain are predominant in NSTEMI cases of ACS. Our study showed a significant association between prior PCI and ACS patients with NSTEMI (p=0.04). Consistently, Sidhu et al [36] cohort study in India which found that prior ischemic heart disease or PCI is related to NSTEMI cases of ACS. Our study showed that post-PCI LVEF was significantly lower in patients with STEMI (p=0.02). This finding is parallel to results of Otero-García et al [37] retrospective study in Spain which reported that about 40% of cases with STEMI had low LVEF after PCI. Our study also found a significant association between anemia and ACS patients with STEMI (p=0.02). This finding is consistent with results of Riley et al [38] study in United States which found that anemia is common co-morbidity for ACS patients with STEMI. Although no significant difference in mortality outcome, STEMI cases had higher in-hospital mortality than NSTEMI cases. This finding is similar to results of Ahmed et al [39] prospective multi-centers study in Yemen which reported high in-hospital mortality outcome in STEMI cases. Our study also found a significant association between smoking and male ACS patients (p=0.001). This finding is similar to results of Mohammad et al [40] in Duhok city-Kurdistan region/Iraq which revealed that except for smoking, all other risk factors were more frequent in women.

5. CONCLUSIONS

The clinical characteristics of patients with acute coronary syndrome are comparable to other literatures, while in-hospital short term outcomes are better than previous national literatures. The left ventricular ejection fraction of patients with acute coronary syndrome is improved after implementing percutaneous coronary intervention. NSTEMI cases are more prevalent in atypical symptoms and prior PCI, while STEMI cases are related to low LVEF, anemia and poor outcomes. Smoking risk factor is more prevalent in male gender patients. Our study recommended early percutaneous coronary intervention for patients with acute coronary syndrome.

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Ethical Clearance:

All ethical issues approved by the authors. An ethical approval was taken from Kurdistan Board Ethical Committee, oral and signed informed consent of patients about responsibility in management of patients with complications. Patients enrollment and data collection were in accordance with the World Medical Association (WMA), declaration of Helsinki, The Ethical Principles for Medical Research Involving Human Subjects, 2013.

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