

CLINICAL AND ANGIOGRAPHIC CHARACTERISTICS OF YOUNG PATIENTS WITH ACUTE CORONARY SYNDROME IN ERBIL SURGICAL SPECIALTY-CARDIAC CENTER

Mohammed Haini Othman ¹ and Mudhafar Abdulrahman Habib ²

¹ MBChB, Trainee of Cardiovascular Medicine at KHCMS, Erbil Cardiac Center, Erbil, Iraq.

*Corresponding Author Email: mohammedhaini@gmail.com

² MBChB, PhD (Cardiology), FRCP (Glasg.) and (London), Assistant Professor of Cardiology, Hawler Medical University, College of Medicine Erbil Iraq.

Email: mudhafar.abdufrahman@hmu.edu.krd

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Abstract

Introduction: ischemic heart disease is the causative agent of death universally and its frequency is increasing. However, recent studies have shown a declining mortality rate in Europe due to coronary artery disease (CAD). **Objectives:** The purpose of this study is to evaluate the patient's characteristics, demographic features, risk factors, and angiographical analyses of all patients which were enrolled in the study. **Methods:** This is an observational cross-sectional single center study which has been done at surgical specialty hospital-cardiac center which is located in the city of Erbil-Kurdistan region-Iraq, All patients with acute coronary syndrome diagnosed during the period of 1st. August of 2022 till 4th. July of 2023 included 1,599 patients have been admitted to CCU during the study of all age groups. From those exactly 191 patients who were 18-45 years old have been taken and included in the study criteria. **Results:** The prevalence of ACS among young patients is 11.94%. The majority were men 175 (91.6 %) and those from urban districts 80%. Chest pain is the most frequent presenting symptom (98%) while, sweating (45%) was the most common associated symptom. Overweight-obesity (BMI more than 25) and smoking were the two most frequent risk factors 81.2% and 75.9% subsequently. The most common ECG presentations among young ACS populations were anterior ST-T changes (40.3%). Overall, STEMI was found in 68.1 % of cases. The culprit lesion was acute clot containing and/or critical lesions (> 70% of luminal stenosis) in the majority which are 94 patients (49.2%) and 51 patients (26.7%) respectively. Moreover, both single vessel disease (SVD) and LAD were seen in about half percent of them respectively. primary percutaneous coronary intervention (PPCI) has been done exactly for 68.1% (130 patients). the mortality rate was 2.1% **Conclusion :** Males represented the majority of cases which were lived in urban districts. the most relevant risk factors among young patients were overweight, obesity and smoking who were underwent PCI most commonly for single vessel disease which was LAD artery in case of anterior STEMI. control the most relevant risk factors was the cornerstone among patients who were seeking medical contact as soon as possible.

Keywords: Acute Coronary Syndrome, Myocardial Infarction, Angiography.

INTRODUCTION

Coronary heart disease is a major cause of morbidity and mortality all over the world. As known, ischemic heart disease is the causative agent of death universally, its prevalence and frequencies are increasing. So, nowadays it is common among young age patients¹. However, recent studies have shown a declining mortality rate in Europe due to coronary artery disease (CAD)². Although acute coronary syndrome (ACS) mostly would occur among patients aged more than 45 year especially old age patients, when it being occurred in young adults it has significant commercial and mortality consequences for the family and governments³. Previously, CAD was a major disease burden for westerners and developed continents, also, recently it is being a global disease incidence specifically in our country Kurdistan-Iraq. The vast majority of clinical trials have shown a low incidence and prevalence of ACS among young patients, which is nearly 3-4% of all cases presented to the emergency

departments globally ⁴. The clinical characteristics vary which ranging from sudden collapse and death, electric-mechanical cardiovascular shocks, ongoing severe refractory pain, acute valvular heart disease, fatal ventricular and heart wall ruptures to patients who have been completely pain free during presentation and admissions at emergency departments or intensive coronary care units ⁵. Lastly, as a consequence of global economic changes, industrializations and population overgrowth, mortality rate has been raised in un-mature nations and countries as a result of un-healthy factors changes, while it has been declined a little bit in other developed nations ⁶. So, as being said the occurrence of cardiovascular risk factors tends to be increased in our region of Kurdistan-Iraq mostly owing to inappropriate deal with controlling those risk factors ⁷. The study purpose is to evaluate the patient's characteristics, demographic features, risk factors, and angiographical view analyses of all young patients who were suffered from acute coronary syndrome which were enrolled in the study.

Objectives:

To know the demographic characteristics and clinical presentations among young patients who were presented with ACS. Also, to clarify the angiographic characters in detail and their relationship with cardiovascular risk factors during managements. Finally, complications and short-term mortality within 24 hours peri ACS.

MATERIALS AND METHODS

This is an observational cross-sectional single center study which has been done at surgical specialty hospital which is located in the city of Erbil-Kurdistan region-Iraq. Although Surgical specialty Hospital-cardiac center Teaching Hospital is the only official tertiary referral center for the Erbil governorate, many other private Hospitals are present with their catheterization departments but with low volumes of cardiac intervention in comparison to Erbil cardiac center. Therefore, patients were referred even outside Erbil districts (Sulaimanya, Karkuk, Duhok, Mosul and etc...) and its hospitals to Erbil cardiac center. Kurds' nationality constitutes >93 % of its population at Erbil city and 17% of Iraq. All young patients who were enrolled in the study were being eighter interviewed directly during admission or phoned up to take history. Also, files have been opened up and filled for them with detailed history and information. the study has been approved by both scientific and ethical comity of Kurdistan higher council of medical specialties. All patients with acute coronary syndrome diagnosed during the period of 1st.August of 2022 till 4th.July of 2023 included 1,599 patients have been admitted to CCU during the study of all age groups. From those exactly 191 patients who were 18-45 years old have been taken and included in the study criteria. however, many studies have used age 40 years old as cut off for young people and fulfill the diagnosis of (ACS).

Acute coronary syndrome diagnosed based on clinical symptoms, cardiac enzymes and ECG changes according to American college of cardiology(ACC) definitions. All patients with STEMI, NSTEMI and unstable angina have been studied. ACS involved ST segment elevation MI with its equivalentents (new LBBB), Non-ST segment elevation MI with or without ECG changes with positive cardiac biomarkers and Unstable angina with or without ECG and cardiac changes ^{2,5,6}. A structured questionnaire being used to collect information. Data on demographic, angiographic and procedural characteristics, risk profile, and in-hospital outcomes were recorded for all patients.

Examination and history were done to all of them, followed by investigations; CBC, random blood sugar and Hemoglobin A1c, Renal Function test, Echocardiography, Serial high sensitivity Troponins, lipid profile for dyslipidemia, ECG, chest X-ray (some cases), Coronary angiography, Virology screen, and Covid 19 PCR. All Patients being admitted to CCU under close monitoring like (PB, PR, SPO₂, RR). BP has been taken by automated machines from left or right arm. Therefore, hypertension being defined as SBP \geq 130, DBP \geq 80 mmhg or on medications ⁶. Increased body weight (> 25, > 30) kg/m² was considered as Overweight and obesity respectively. DM being diagnosed when patients were on medication for DM or previous history of diabetes mellitus, FBS \geq 126 mg/dl, post-prandial plasma glucose, RBS \geq 200 mg/dl and HBA1C =6.5 and more. Hyperlipidemia was defined as total cholesterol \geq 200 mg/dl, triglyceride >150 mg/dl, LDL > 130 mg/dl, HDL (<50 or <40) mg/dl for eighter female and male respectively and those on medication for dyslipidemia ⁶. The risk factors which were studied were smoking habits, DM, HTN, body mass index, dyslipidemia and premature CAD (in first degree relatives < 55 years in men and < 65 years in women). Coronary artery lesions were being defined as critical lesion in non LMS when \geq 70 %stenosis and \geq 50% in LMS and Proximal LAD artery), any lesion 50%-69% (intermediate lesion non LMS), \leq 50% (mild or non-critical lesion) ^{1,6}. Also, culprit arteries were diagnosed by coronary angiography. Patients who still smoke cigarette or giving up smoking not more than 1 year..

Inclusion criteria:

The diagnosis of the different types of ACS (ST-elevation myocardial infarction [STEMI], non-ST-elevation myocardial infarction [NSTEMI] and/or unstable angina [UA]) was based on the definitions of European Society of Cardiology (ESC)/ACC foundation. So, new STEMI \geq 2 contiguous lead of \geq 2 mm in males or \geq 1.5 mm in females from leads V₂-V₃ and/or of 1 mm in another contiguous chest or the limb leads, and new left bundle branch block (LBBB) was considered STEMI equivalent. All patients aged 18-45 years were included ⁵

Exclusion criteria:

Patients with valvular and congenital heart disease were excluded, also patients with other medical problems that confound the results likes sepsis, renal failure and end-stage kidney disease, severe infections, advanced heart failure, stroke, corpulmonale and/or respiratory failure were excluded from the study ⁵.

Statistical analysis:

All the patient's data were entered into Microsoft Office Excel and being transferred to SPSS IBM statistics Mac version 24. So, IBM SPSS statistics Mac version 24 was used for data analysis. frequencies, percentages and mean \pm standard deviation were calculated for quantitative and categorical variables respectively. Then descriptive statistics were computed and presented as means and standard deviations. Chi square test was used to obtain P-values and compare categorical variables and differences. The level of statistical significance was set at a p value \leq 0.05.

RESULTS

In this observational cross-sectional study 1599 patients of all age groups with acute coronary syndrome had been admitted to ER or CCU of tertiary Erbil cardiac center during the study period of 11 month, from those 191 patients (11.94%) which is our

prevalence were being included according to the criteria of the study. their age was between 18-45 years. The Median age was 40.2 years (SD±4.66) ranging from 22-45 years of age. The youngest patient was 22 years old. Only 7 patients were under 30 years of age, while higher number were between 40 to 45 years of age which were 126 patients. Women were 16 (8.4%), while 175 (91.6 %) were men. Although 80% of patients were from urban, 20% had been lived from rural districts. Table 1 is showing the baseline characteristics and cardiovascular risk factors of ACS patients.

Table1: baseline characteristics of young patients with ACS

Variabilities	Categories	Numbers	%
Sex	Male	175	91.6
	Female	16	8.4
Residency	Urban	158	82.7
	Rural	33	17.3

From clinical presentation points of view, the typical and atypical chest pain accounted for most of the young patient's complain which is 188 (98.4%) patients, while sweating, nausea, dyspnoea were other common symptoms among them. As shown in detail in table no 2.

Table 2: presenting symptoms among young age ACS patients

Clinical symptoms	numbers	%
Pain	188	98.4
Dyspnea	44	23.0
Vomiting	34	17.8
Sweating	86	45.0
C.arrest	8	4.2
Nausea	48	25.1
Palpitation	26	13.6

Although, there is no statistical significance among both men and women young age patients with ACS during their presenting symptoms, while there is statistical significance of presentation among STEMI and NSTEMI ACS patients. The most frequent associated symptoms were sweating (45%), nausea (25%), and dyspnea (23.0%) especially sweating and nausea in inferior wall STEMI ACS patients which is statistically significant (P value: 0.001 and 0.001) respectively. On the other hand, palpitation and dyspnoea were more common and statistically significant in anterior wall STEMI ACS and Lateral wall ACS cases (23.0%, P value:0.010 and 13.6%, P value:0.020) respectively. Table no 3 is showing STEMI and NSTEMI ACS patients with their presenting symptoms, and table no 4 is showing STEMI patients in compare with presentation.

Table 3: young age patients (ACS STEMI and NSTEMI) with their presenting symptoms

Presenting symptoms	STEMI		NSTEMI		P values	Total numbers
	yes	No	Yes	no		
Pain	127	3	61	0	0.232	191
Sweating	68	62	18	43	0.003	
Nausea	38	92	10	51	0.057	
Vomiting	32	98	2	59	0.001	
Dyspnoea	33	97	11	50	0.261	
Palpitation	20	110	6	55	0.414	
Cardiac arrest	7	123	1	60	0.228	

Table 4: young age ACS (STEMI) patients during presentation for management

Presenting symptoms	STEMI						P values	Total numbers
	Anterior		Inferior		Lateral			
	Yes	No	Yes	No	Yes	No		
Pain	75	2	51	1	50	0	0.669	191
Sweating	36	41	34	18	12	38	0.001	
Nausea	17	60	23	29	2	10	0.001	
Vomiting	20	57	12	40	1	11	0.003	
Dyspnoea	24	53	6	46	5	7	0.020	
Palpitation	18	59	3	49	0	12	0.010	

Though, overweight-obesity (BMI more than 25) and smoking were the two most frequent risk factors among this study's young age patients (no:155, 81.2% and no: 145, 75.9%) subsequently, while other risk factors like hypertension and family history, each was found in nearly two fifths of patients.

Moreover, dyslipidemia, DM and alcoholic patients make (28.8%), (24.6%) and (12%) among young patients respectively. More detail has been taken in table no 5.

Table 5: baseline characteristics of young patients with ACS

Risk factors	numbers	%
Smoking	145	75.9
Overweight and obese	155	81.2
HTN	75	39.3
DM	47	24.6
Family history	76	39.8
Alcoholic	24	12.6
Dyslipidemia	55	28.8
Thyroid disease	5	2.6

As being shown in the study HTN, smoking, DM and thyroid diseases were statistically significant among young men and women patients with acute coronary syndrome (p.values : 0.001, 0.001, 0.014 and 0.010)respectively.

Apart from smoking which is significantly higher among male patients, other three risk factors were significantly higher among women patients. As shown in more detail in table no. 6

Table 6: cardiovascular risk factors and gender relationship characteristics.

Risk factors	Female		Male		p.values	Total numbers
	yes	no	yes	No		
HTN	13	3	62	113	0.001	191
DM	8	8	136	39	0.014	
Over-weight and obesity	14	2	141	34	0.498	
Smoker	4	12	141	34	0.001	
Dyslipidemia	4	12	51	124	0.726	
Family history	8	8	68	107	0.383	
Thyroid disease	6	10	3	172	0.010	
Alcoholic	0	16	24	151	0.113	

In contrast, there is no statistical significance of cardiovascular risk factors among rural or urban young patient's ACS. Table no. 7 is showing rural and urban-cardiovascular risk factors relationship.

Table 7: cardiovascular risk factors and residential relationship characteristics

Risk factors	Rural		Urban		p.values	Total numbers
	yes	no	yes	no		
HTN	16	17	59	99	0.233	191
DM	12	21	35	123	0.085	
Over-weight and obesity	25	8	28	130	0.384	
Smoker	26	7	119	39	0.671	
Dyslipidemia	6	27	49	109	0.135	
Family history	14	19	62	96	0.734	
Thyroid disease	0	33	5	153	0.300	
Alcoholic	2	31	22	136	0.215	

Before angiography being proceeded, the most common ECG presentations among young ACS populations were anterior ST-T changes (40.3%), at the same time almost one-quarter of cases were presented with inferior lead ST-T changes. Besides the lateral lead ST-T changes were among the rarest presentation which was only 10 patients. Despite of, non-locatable ECG changes were being observed in 26.2% of young adult ACS persons. Overall, STEMI was found in 68.1 % of young age patients in comparison to only 31.9% of patients with NSTEMI ACS patients. Table no 8 is showing more detail.

Table 8: frequencies of STEMI, NSTEMI and ECG presentations among young ACS patients

Variables	Categories	numbers	%
ECG	Anterior	77	40.3
	Inferior	52	27.2
	Lateral	12	6.3
	Non locatable	50	26.2
Clinical presentation	STEMI	130	68.1
	NON-STEMI	61	31.9
	Unstable	0	0

There is no statistical significance of ECG presentations (anterior, inferior, lateral and non-locatable), mode of presentation, infarcted arteries, disease extend, and complications among young adult male and female patients in the study. As being shown in table no 9.

Table 9: young age men and women patients in compare with some variabilities

Variables	P values	Total numbers
	Male and female	191
Mortality	0.541	
Complications	0.486	
Disease-extend	0.476	
ECG presentations	0.201	
Mode of presentation	0.321	
Infarcted related artery	0.832	

Coronary angiography has been performed in all young age patients. It is being appeared that acute clot containing lesions and critical lesions (type C lesions more than 70% of luminal stenosis) have constituted the majority of young patients with ACS

which are 94 patients (49.2%) and 51 patients (26.7%) respectively. Moreover, 14 patients (7.3%) had normal coronaries and only 8 patients (4.2%) just had non-critical lesions. Despite the fact that single vessel disease (SVD) was seen in about half of the patients in this study which is 48.2% (92cases), while three vessel diseases and two vessel disease were 21.5%(41 patients) and 18.8%(36patients) respectively.

Table no 10 is showing more detail.

Table 10: mode and disease extend of coronary arteries during angiography among young patients

<i>Variables</i>	<i>Categories</i>	<i>numbers</i>	<i>%</i>
Mode of presentation	Normal	14	7.3
	Mild CAD	8	4.2
	Moderate CAD	2	1.0
	Critical CAD	51	26.7
	Total clot containing	94	49.2
	CTO	1	0.5
	Muscle bridge	3	1.6
	Slow flow	8	4.2
	Ectasia	1	0.5
	ISR	2	1.0
	Stent thrombosis	5	2.6
	Spontaneous CA dissection	1	0.5
	Disease extend	Single vessel disease	92
Two vessel disease		36	18.8
Three vessel disease		41	21.5

Young diabetic patients were presented with eighter multi-vessel disease and/or multiple variable lesions, which is statistically significant (p value :0.001) in contrast to other cardiovascular risk factors which were not statistically significant as being single vessel disease or multi-vessel disease. Table no 11 has showed more detail.

Table 11: disease extends among young patient's cardiovascular risk factors

<i>Variables</i>	<i>P values</i>	<i>Total numbers</i>
	Disease extends	
HTN	0.124	191
DM	0.001	191
Smoking	0.198	191
Alcoholic	0.882	191
Overweight and onbesity	0.427	191
FH	0.807	191
Thyroid disease	0.186	191
Dyslipidemia	0.827	191

On the one hand, the culprit coronary artery was anterior descending artery (LAD) in the majority of patients, nearly half of them which is 51.3%(98patients). While, right coronary artery (RCA) and left circumflex artery (LCX) were being the second and third most common culprit arteries in about one fifth of young patients 19.4%(37patients) and 8.4%(16patients) respectively. On the contrary, second diagonal (D2) and posterior descending artery (PDA) were not being found at all as culprit lesion which is 0 % (0 patients). Also, only 5 patients have had left main coronary artery (LMS) as culprit lesion. Table no 12 shows more detail.

Table 12: culprit coronary arteries among young patients.

<i>infarct related artery</i>	<i>Numbers</i>	<i>%</i>
LMS	5	2.6
LAD	98	51.3
RCA	37	19.4
LCX	16	8.4
Ramus intermedius	3	1.6
D1	3	1.6
D2	0	0
OM1	8	4.2
OM2	3	1.6
PLV	3	1.6
PDA	0	0

On the other hand, after diagnosing coronary artery culprits among young patients, primary percutaneous coronary intervention (PPCI) has been done exactly for 68.1% (130 patients), while 20.9%(40 patients) were being put on optimal medical therapy (OMT). Furthermore, 3 patients were refused intervention (PPCI) and only 11 patients underwent urgent CABG (coronary artery bypass graft). Table no 13 is showing more detail.

Table 13: post angiography interventions among young patients with ACS

<i>Intervention</i>		<i>Numbers</i>	<i>%</i>
	CABG	11	5.8
	PCI	130	68.1
	OMT	40	20.9
	Refused	3	1.6
<i>Mortality</i>		4	2.1

Finally, Drug eluting stents have been put for 120 patients while, ballooning has been used either as dottering and/or support to prepare the lesion. Albeit, only 20 patients were being put on Tirofiban infusion as bail-out for heavy clot burden coronary lesions. There were some adverse events within 24 hours of intervention, the two most common complications were chest pain and arrhythmia (VT/VF) in 7 patients for each complication. Only, 4 patients died during 24 hours of hospital admission as shown in table no13.

DISCUSSION

Currently, has been approved from most recent trials that young age (acute coronary syndrome) patient's number has raised constantly. Annually around one and a quarter million cases of young age ACS patients were needed admission and intervention in tertiary hospitals⁸. Frankly speaking, the prevalence of young aged acute coronary syndrome patients in this study is 11.94%. on the one hand, this result is comparable to the prevalence of same age population ACS, which was 13% in Lebanon (at 2008), 11.6% in Jordan (at 2004)and 9% in Egypt (at 2001).

On the contrary, the result is not approximate and much higher than ACS cases among same young adults in Saudia Arabia's multi-surveys which was (6% and 4.5%)^{3,9,10}. In addition, multiple other studies have the prevalence around (6%), again not comparable and much lower than this study^{11,12,13,14,15,16}. By the way, the common cardiovascular risk factors among young age population can be put in two major categories. From one point of view, (smoking, DM, HTN, dyslipidemia, alcoholics,

stressful life style and physical inactivity, BMI more than 25) are modifiable risk factors. From another point of view, (age, ethnicity, gender, family history of CAD in first degree relatives) are the most frequent non modifiable cardiovascular risk factors^{3,17}. In consequences, accumulation of multiple comorbidities and/or multiple risk factors among populations especially within young age groups, it is expected that the incidence of ACS will be raised dramatically in the future⁹.

As a matter of fact, being male is the major non modifiable cardiovascular risk factor in this study which is 175 (91.6%) patients. So, it is comparable to previous Iraqi study which was 85%, while not the same and much higher than another Iraqi study which was 58.5% and the Saudi Arabia study 75%^{18,19,20}.

Although, chest pain is the most common presenting symptom in both young age men and women, it is even much higher than recent Iraqi study (Mohammed AM et al) at 2020 which was (80.3%)⁷.

It seems to be the modifiable risk factors (smoking and BMI more than 25) are common among young aged patients which is similar to previous Saudi Arabia study (78% and 77%) respectively at 2019 (Bugami SAI et al)⁴, at the same time greater than previous Iraqi study (62%) at 2018 (Mirza AJ et al)^{21,22}. As known, diabetes is a major risk factor for cardiovascular and non-cardiovascular arterial atherosclerosis. Therefore, the prevalence of DM among this study's young ACS is nearly same as previous Iraqi study at 2018 which was 22%. Conversely, it is significantly lower than previous Saudia Arabia study (Bugami SAI el at) which was 46.7%at 2019³ and (Al-Mukhtar SB et al) which was 50 %²⁰. Hypertension and Family history of ischemic heart disease among first degree relatives are major risk factors. So, both of them far greater than previous Iraqi study (at 2008) which were 26% and 24% respectively²².

In regard to heart wall myocardial infarction, anterior STEMI was the most common presentation followed by inferior STEMI. Furthermore, the prevalence STEMI ACS among young patients in this study significantly larger than previous surveys in Saudia Arabia (at 2012) which was 38%²³and (at 2019) which was 57%². The percentage of single vessel disease is nearly similar to previous Kurdistan region of Iraq study (at 2021) which was 46.8%²⁴. However, it is less than another previous Iraqi study (at 2013) which was 35%²⁵. Additionally, three vessel disease comparable to previous Iraqi study (at 2021) which was 21.3%²⁶ while, double times lower than previous study by Akanda et al (at 2011) which was 40.66%²⁶.

As a fact that epicardial coronary arteries were the most common coronary arteries which were being occluded during myocardial infarctions. Therefore, is the most common epicardial artery in this study which needed intervention. It is a little bit higher than previous Iraqi study (at 2013) which was 4.1.6%²⁵ and previous Pakistan study (at 2013) which was 42%²⁷. the RCA was about 19.3%. each of PLV, OM2, D1, Ramus intermedius were about 1.6% for each of them., second most common was LCX (29.3%) two-fold higher than ours which was (8.4%). Another study showed LAD (42%), RCA (32%), LCX (26%) by Shah et al²⁶ 10% lower and 10 higher than ours respectively. Also, LCX showed double percentage (26%) higher²⁶.

A large multicenter studies are required to assess ACS patients characteristics and risk factors in detail among young age groups in our community populations. Therefore, our single center study and small number patients considered one of the limitations faced in the study.

CONCLUSION

Male patients represented the majority of cases which were lived in urban districts. the most relevant risk factors among young patients were overweight, obesity and smoking who were underwent PCI most commonly for single vessel disease which was LAD artery in case of anterior STEMI. control the most relevant risk factors was the cornerstone among patients who were seeking medical contact as soon as possible.

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