CLINICAL CHARACTERISTICS AND MORTALITY RATE IN PATIENTS HOSPITALIZED DUE TO ACUTE CORONARY SYNDROME DURING ONE YEAR AT A SINGLE CORONARY CARE UNIT

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ABSTRACT

Acute coronary syndrome (ACS) is the leading cause for coronary care unit admissions. It ranges from non-ST-elevation acute coronary syndrome (NSTEACS) including non-ST-elevation myocardial infarction and unstable angina to acute ST-segment elevation myocardial infarction (STEMI) . Our aim was to study the clinical picture, management and outcome of ACS patients admitted to the coronary care unit (CCU) at a tertiary heart centre in Tripoli-Libya. A retrospective study was performed on the spectrum of ACS in subjects admitted to the CCU in Tajoura National Heart Center from January 2014 to December 2014. Details including coronary risk factors, categories and outcomes were analyzed. A total of 84 patients were included in the study, the majority 64 (76.2%) were males. their mean age was 58± 14 years, 22(26.1%) were < 50 years, and the most common age group was from 50 to 59 years. The majority 60 (71.4%) had STEMI and 24 (28.6%) had NSTEACS. The major coronary disease risk factors were; diabetes 38 (45.2%), hypertension 38 (33.3%), history of ischemic heart disease 18 (21.4%), chronic kidney disease (CKD) 15 (17.9%) and smoking 41 (48.8%). According to GRACE score, 13 (15.5%) were categorized as high risk, 13 (15.5%) intermediate risk and 56 (66.7%) low risk. 30 patients (35.7%) received thrombolytic therapy, 33 (39.3%)underwent percutaneous Coronary intervention (PCI), 6 patients (7.1%) received both forms of therapy. The mean duration of CCU stay was 4.26 ± 5 days. 11 (13.1%) patients died in the CCU including 6 (10%) with STEMI and 5 (20.8%) with NSTEACS, their. The mortality was more among the older patients (mean age was 68.45 years ± 14.6) (P.008) and the likelihood ratio of death was more in; females (2.9), CKD patients (2.5), high grace score (10.45) (P .008) and in patients who did not undergo PCI (12) (P.004). In this study, the ACS patients were of relatively younger age, higher prevalence of diabetes and higher GRACE risk score. Compared with the European centers; PCI was less (almost half) performed and fibrinolytic therapy was more used in STEMI, and PCI was less performed in NSTEACS. The CCU mortality was high and further studies are needed to evaluate it's the underlying reasons.

KEY WORDS: acute coronary syndrome, coronary care unit, mortality

INTRODUCTION

Acute coronary syndrome (ACS) ranges from Non–ST-segment Elevation ACS (NSTEACS) which includes Non–ST-segment Elevation Myocardial Infarction and unstable angina to ST-elevation MI (STEMI) and sudden cardiac death[1]. In recent years, significant progress has been made in both the diagnosis and the treatment of ACS, European and American cardiology associations have published new guidelines to address these changes in medical practice[1–4].

Low- and middle-income countries have a dramatic rise in ischemic heart disease risk factors such as obesity and diabetes, smoking, consumption of unhealthy products, alcohol, and low levels of physical activity. There is also limited availability of evidence-based therapies and interventions, and the outcomes of ACS are often poor[5-7].

Coronary care units (CCUs) were designed to monitor and prevent fatal arrhythmias in patients suffering from acute myocardial infarction. During the last 3 decades, the CCU role has expanded to include ACS patients in general[8,9]. The aim of this study was to analyze the patterns and mortality of ACS in patients admitted to the coronary care unit at Tajoura National Heart Center which is a referral cardiology centre at Tripoli-Libya.

METHOD

This is a retrospective study in which the hospital records of all patients admitted to the CCU at Tajoura National Heart Center from January 2014 to December 2014 were reviewed. Patients admitted with chief diagnosis of ACS were all included. Relevant data was extracted from the files including the demography of patients, risk factors, medical and medication history, diagnosis, management and CCU mortality.

STEMI was defined as new ST-segment elevation in ≥ 2 contiguous leads with ≥ 0.2 mV in V1, V2, or V3 or ≥ 0.1 mV in other leads or presence of a new left bundle branch block with positive cardiac enzyme results. NSTEMI was defined as electrocardiographic changes other than ST segment elevation with either positive or negative cardiac enzyme results. Left ventricular dysfunction was classified by echocardiography as sever if ejection fraction (EF) is <30%, moderate (30-40%), mild (40-55%) or normal (>55%).

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The Global Registry of Acute Coronary Events (GRACE)risk score is a predictive model using 8 prognostic variables (age, initial heart rate, initial systolic blood pressure, initial creatinine, Killip class, cardiac arrest on admission, ST elevation, cardiac enzymes or markers and percutaneous intervention) to determine the patient's probability of in-hospital death as well as the 6 months mortality[10]. Our study patients were categorized according to GRACE Risk 2.0 into low risk patients with ≤ 100 points (In-hospital death rate < 1%), medium risk patients with 101-170 points (In-hospital death rate 1-9%) & high risk patients with > 171ponits (In-hospital death rate > 9%)[11].

Data analysis

Was performed using the SPSS software (Statistical Package for the Social Sciences, version 16.0 (SPSS Inc, Chicago, Ill, USA). Continuous variables are demonstrated as means (±SD), and categorical variables as numbers and percentages. Categorical variables were analyzed by chi-square test & student's t-test was used for continuous variables. P values < 0.05 were considered significant.

RESULTS

The baseline characteristics of the patients is shown in (table 1); the total number was 84 patients, the mean age was 58± 14 years, the most frequent age group were the 50-59 ,then the 60-69 and 40-49 years (figure 1). Twenty two patients (26.1%) were < 50 years.

(Table 1) Baseline characteristics of patient with acute coronary syndrome

Variable	Total n= 84	STEMI n= 60 (71.4 %)	NSTEACS n= 24 (28.6%)	P value
Demographics				
Age years (mean ±SD)	58±14(16-91)	58.8±13.6 (24-91)	55.9 ± 15.2	0.890
Male (%)	64 (76.2%)	49 (81.7%)	15 (62.5%)	0.083
Risk factors				
Diabetes (%)	38(45.2%)	29 (48.3%)	9 (37.5%)	0.57
Hypertension (%)	28 (33.3%)	17 (28.3%)	11 (45.8%)	0.118
Ischemic heart disease (%)	18(21.4%)	11(18.3%)	7 (29.2%)	0.104
Chronic kidney disease (%)	15(17.9%)	11 (18.3%)	4 (16.7%)	0.088
Smoking (%)	41(48.8%)	31 (51.7%)	10 (41.7%)	0.254
At presentation				
Heart rate	85.6 ± 23 (32-145)	83.7 ± 23.8	90.4 ± 21	0.671
Systolic BP (mean ± SD)mmHg	100 ± 32 (60-230)	130 ± 32.5	127 ± 33	0.796
Diastolic BP (mean ±SD)mmHg	82.6 ± 17.9 (40-140)	83 ± 18.7	80 ± 15	0.789
Positive serum troponin (%)	33(39.3%)	20 (33.3%)	13 (54.2%)	0.304
CKMB mg/dL	136 ± 16	159 ± 18.6	79.2 ± 67	0.943
Total cholesterol mg/Dl (mean ±SD)	165± 46	167± 48	163 ± 39.7	0.202
Serum Cr mg/dL	1.2 ±0.9	1.23± 0.9	1.17 ± 0.85	0.404
Echo ejection fraction % (mean ±SD) Normal (%) Mild (%) Moderate (%)	54 ±11(31-79) 35 (41.7%) 29 (34.5%) 6(7.1%)	 24 (40%) 23(38.3%) 5 (8.3%)	 11(45.8%) 6 (25%) 1 (4.2%)	0.632
GRACE score High Intermediate Low	 13(15.5%) 13 (15.5%) 56 (66.7%)	 10(16.7%) 7 (11.7%) 41(68.3%)	 3 (12.5%) 6 (25%) 15 (62.5%)	0.083

Values are expressed as mean ± SD or percentage, significance by Chi square or independent T-Test

64 of the patients (76.2%) were males (figure 1), 38 (45.2%) had diabetes, 38 (33.3%) had high blood pressure, 18 (21.4%) had a history of ischemic heart disease(IHD), 15 patients (17.9%) had Chronic Kidney disease(CKD) and 41 were current or ex-smokers (48.8% of the total patients and 64% of the male patients).

Sixty patients were diagnosed as STEMI (71.4%), 24 patents had NSTEACS (28.6%) (figure 2). At presentation, the mean heart rate was 85.6±3, the mean systolic blood pressure (BP) was 100± 32 mmHg, and the mean diastolic BP was 82.6 ±17.9.
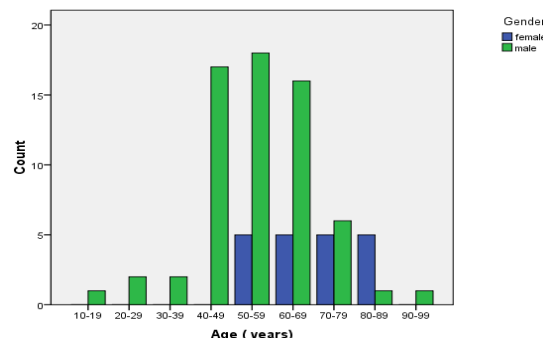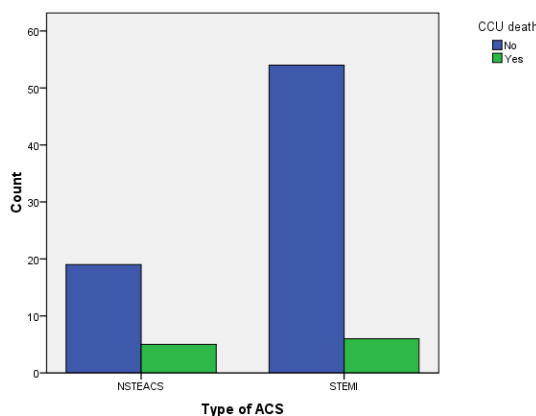

(Figure 1) Distribution of the patients according to age and gender

The mean serum CKMB was 136 ± 16 mg /dl, 33 patients (33.9%) had positive troponin results, and the mean serum cholesterol and creatinine were 165 ± 46 mg /dl and 1.2 mg/dl ± 0.9 respectively. By echocardiography; 35 patients (41.7%) had normal LV function, 29 (34.5%) had mild LV dysfunction and 6 (7.1 %) had moderate LV dysfunction. According to GRACE risk score; 13 patients (15.5%) were categorized as high risk, another 13 (15.5%) as medium risk and 56 (66.7%) as low risk. There was no significant statistical association between any of the above variables and the diagnosis (STEMI vs NSTEACS).

Eleven (13.1%) patients died while in the CCU including 6 (10%) of STEMI and 5 (20.8%) NSTEACS patients, 8 of them (72.7%) were > 70 years of age (Figure 3&4). The mean age of the CCU deaths was 68.45 years ± 14.6, compared with 56.46 ±14 years among the patients who survived (P .008). The likelihood ratios of the CCU deaths
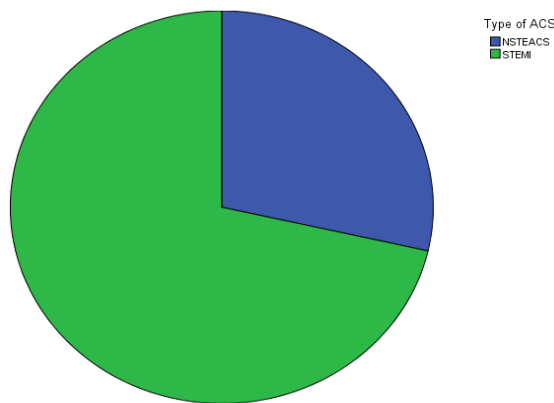
(Figure 2) Distribution of the patients by the ACS type

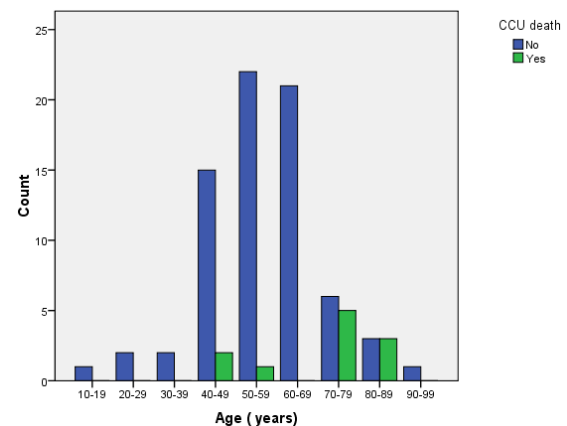**(Figure 3)** Distribution of CUU deaths by the type of ACS

(Table 2) Shows the management and outcome of the patients; 30 patients (35.7%) received thrombolytic therapy, 33 (39.3%) underwent percutaneous Coronary intervention (PCI), 6 (7.1%) received both forms of therapy. The mean duration of CCU stay was 4.26 ± 5 days. Upon discharge from the CCU; 54 patients (64.3%) were prescribed RAAS blocker therapy, 73(86.9%) prescribed a beta blocker, and 79

(94%) prescribed Asprin , Clopedogril and statin. Again, there was no significant statistical association between the above variables and the diagnosis (STEMI vs NSTEACS).

(Table 2) Management & outcome of the study patients

Variable	Total n= 84	STEMI n= 60 (71.4 %)	NSTEACS n= 24 (28.6%)	P value
Thrombolytic therapy (%)	30 (35.7%)	30(50%)	none	0.000
PCI (%)	33 (39.3%)	25(41.7%)	8 (33.3%)	0.670
Both (%)	6 (7.1%)	6 (10%)	none	0.444
Neither (%)	20 (23.8%)	11(18.3)	9 (37.5%)	0.376
Evidence based Medications				
ACEI/ARB	54 (64.3%)	45(75%)	9 (37.5%)	0.017
Beta blocker	73(86.9%)	60 (100%)	13(54.2%)	0.621
Asirin & Clopidogrel	79 (94%)	60(100%)	19 (79.2%)	0.633
Statin	79 (94%)	60(100%)	19 (79.2%)	0.639
CCU duration of stay days (mean ±SD)	4.26 ± .5 (1-25)	4.28 ±3.4 (1-25)	4.2 ± 3.8	0.000
CCU mortality (%)	11 (13.1%)	6(10%)	5 (20.8%)	0.285

Values are expressed as mean ± SD or percentage, significance by Chi square or independent T-Test

(Figure 4) Distribution of CUU deaths by the age

(Table 3) was 2.9 among females, 2.5 in CKD patients , 10.45 in patients with high GRACE score (P .008) and 12 among patients who did not undergo PCI (P.004) .

(Table 3) analysis of the patients who died in the CCU

Variable	P value	Likelihood Ratio
Age	.008[1]	-
Gender	.071	2.9
Diabetes	.526	.40
CKD	.086	2.5
Hypertension	.65	.215
Ischemic heart disease	.612	.24
Smoking	.376	.795
GRACE score	.008	10
Catheterization	.004	12

Significance by Chi square or independent T-Test

(Table 4) shows the CCU death according to the GRACE risk categories, the actual mortality was high across the GRACE risk tertiles especially the high risk NSTEACS patients (100%) , who all had concomitant heart failure.

(Table 4) The actual CCU deaths according to GRACE risk score

ACS type	No. & percentage	CCU mortality; No. & percentage	Predicted mortality
STEMI	60		
High score (>171points)	9/60(15%)	2/9 (22.2%)	>9%
Intermediate score(101-170points)	8/60 (13.3%)	2/8 (25%)	1-9%
Low score ≤ 100 points)	43/60 (71.7%)	2/43 (4.6%)	<1%
NSTACS	24		
High score	3/24 (12.5%)	3/3 (100%)	>9%
Intermediate score	1/24 (4.1%)	1/6 (16.7%)	1-9
Low score	1/24 (4.1%)	1/15 (6.7%)	<1%

DISCUSSION

The frequency of ACS types in our study was 71.4% for STEMI and 28.6% for NSTEACS, which is comparable to 69.8% & 30.2% rates in a study from Yemen (GULF RACE-2 Registry)[12]. The high frequency of STEMI in our study could have been due to the referral selection polices from other hospital. The mean age of the patients (58±14 years) was also comparable with the GULF RACE-2 Registry (58±12 years), and both were almost a decade younger than of a European survey on ACS[13]. 76.2% of our patients were males, going with GULF RACE-2 patients 79.2% but higher than the 71.6% in the European survey. Regarding the cardiac risk-factors; 33.3 % of our patients had hypertension comparable with 34.6% in the GULF RACE-2 and lower than the 50% ratio in the European survey. 45.2% of our patients had diabetes, which was high compared to both the GULF RACE-2 and the European survey (23.2% and 21% respectively). 64% of the male patients were ex or current smokers going with the 62% and the 72.1% ratios in the European survey and the GULF RACE-2, and 19% of our patients had a past history of IHD, compared with the 32% in the European survey.
According to Grace Score; 66.7% were classified as low score, 15.5 % intermediate and another 15.5% as high score , compared with 65% low score, 25.6% intermediate and 9.4% high score in the GULF RACE-2 Registry.
The current Guidelines[2,4] advise that STEMI patients should undergo PCI rather than receive fibrinolytic therapy as long as PCI is available within 90 minutes of first medical contact. Otherwise, fibrinolysis should be started within 30 minutes. In our

study, PCI was used in 41 % of the STEMI patients and 50% received fibrinolytic therapy (mainly tissue plasminogen activator), compared with 79% PCI and 21% fibrinolytic therapy in the European survey. Guidelines for NSTEMI and unstable angina[1,3] prefer an early invasive strategy, particularly for high-risk patients, although a conservative strategy is considered acceptable if patients receive intensive evidence-based medical therapy and remain clinically stable. PCI was performed in 27.8% of our NSTEMI patients compared with 37.1% in the European survey.
At discharge from the CCU, there was a satisfactory use of evidence-based medications[14]: Aspirin was prescribed to 100% and 80% of the STEMI NSTEACS respectively and going with 96.8% and 94.5% in the European survey. Clopidogrel was prescribed to 100% and 80% (comparable with 69.8% and 67.4%), statins prescribed to 100% and 80% (comparable with 80.7% and 73.7%), Beta-blockers prescribed in 100% of STEMI and 54.2% of NSTACS patients (compared with 83% and 82.8%) and ACEI/ARBs in 75% and 37.5% (compared with 75% and 69.5% in the European survey)
The mean duration of CCU stay was 4.26±5 days was going with similar studies[15]. The CCU mortality was 13.1 % (10 % in STEMI and 20.8% in NSTEACS), which is higher than 4% in-hospital mortality in the European survey, or 8.6% in-hospital mortality in the GULF RACE-2 Registry. Mortality was more among older patients (0.008) (mean age of 68.45 years ±14.6 compared with 56.46 ±14 years among the patients who survived) and was high across all the GRACE risk tertiles, especially the high risk NSTEACS patients (100%) who also had heart failure .Other studies have shown that acute heart failure during hospitalization increases ACS mortality[16]. The CCU mortality was higher among the females and CKD patients; again going with the findings of other related studies[17-19]. This high rate of CCU mortality could be explained by delay of presentation, or referral polices from other hospitals , however, our study was limited by the available documented data, and we were not able to decide which factor (s) contributed more. The less mortality observed in patients who underwent catheterization can be due selecting more stable patients for the procedure.

CONCLUSION

In this study, the ACS patients were of relatively younger age, higher prevalence of diabetes and higher GRACE risk score. STEMI was the major clinical form of ACS. Compared with the reperfusion in European centers; PCI was less (almost half) performed and fibrinolytic therapy was more used in STEMI. PCI was also less performed in NSTEACS. The CCU mortality was high (13.1 %) and further studies are needed to evaluate the underlying reasons for this finding

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