RESULTS

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I) DEMOGRAPHIC DATA

A total of 210 consecutive patients with ACS who admitted to CCU of Benha University Hospital from February 2008 to August 2008 were included. 38 patients (18.1%) of them presented with complicating pulmonary edema. All patients received conventional treatment. They were followed up during their hospital stay and for three-month after hospital discharge.

Of the 210 patients, 127 males (60.5%) and 83 females (39.5%) their age ranged between (39-77 years) with mean age of (57.3 ± 8.4 years). Of the 210 patients, 128 (61%) were hypertensive, 81 (38.6%) were diabetic, 112 (53.3%) were dyslipidemic, 88 (41.9%) were smokers and 64 (30.5%) had prior MI **(Table 1 and Table 2).**

ECG:

Admission ECG showed ST-segment elevation in 84 (40%) patients and ST-segment depression and T wave changes in 126 (60%). It showed significant arrhythmias in the form of atrial fibrillation (AF), ventricular tachycardia (VT) and premature ventricular contractions (PVCs) in 31 (14.7%) patients and LBBB in 15 (7.1%) patients **(Table 3 and Table 4).**

Myocardial necrosis markers:

Peak CK-MB and troponin were elevated in 149 (71%) patients and normal in 61 (29%) patients **(Table 4).**

Arterial blood gases sampling:

ABG revealed normal results in 186 (88.6%) patients and hypoxia in 24 (11.4%) patients **(Table 4).**

Chest x-ray findings:

Cardiomegally and lung congestion were noticed in 59 (28%) and 37 (17.6%) patients respectively **(Table 4).**

Echocardiography:

133 patients (63.3%) had segmental wall motion abnormalities at rest. 72 (34.3%) patients had impaired global contractility with reduced EF (<45%). 18 (8.6%) patients had diastolic dysfunction. 38 (18.1%) patients had left ventricular hypertrophy. And 41 (19.5%) patients had moderate to sever MR **(Table 5).**

Coronary Angiography:

Coronary angiography was not done to 11 (5.2%) patients because of early hospital death. 57 (28.6%) patients had one-vessel disease, 57 (28.6%) patients had two-vessel disease, and 86 (43.2%) patients had three-vessel disease **(Table 7).**

Coronary revascularization

72 (34.2%) patients received streptokinase, 49 (24.6%) patients underwent per-cutaneous coronary intervention (PCI) and 12 (6%) patients had coronary artery bypass grafting (CABG) as shown in **(Table 8).**

II) FOLLOW UP

A) In-hospital events:

132 (62.8%) patients passed without any complications. 28 (13.3%) patients had significant arrhythmias varying from AF, VT and atrio-ventricular block. Four (1.9%) patients had acute HF and 7 (3.3%) patients had recurrent ACPE. 10 (4.7%) patients had recurrent angina and 9 (4.2%) patients had re-infarction. 20 (9.5%) patients had developed cardiogenic shock and 11 (5.2%) patients died within the hospital before discharge **(Table 6).**

B) Three-month follow up:

Patients were followed over three month duration by telephone calls for the recurrence of signs and symptoms pulmonary edema, acute coronary syndrome and mortality.

Patients with adverse clinical events were asked to come to hospital and their medical records were reviewed.

After three months, 96 (48.2%) patients were passed without any complications. 10 (5%) patients were re-admitted with recurrent ACPE, 9 (4.5%) were re-admitted with acute HF, 27 (13.6%) patients were re-admitted with recurrent angina, 35 (17.6%) patients with recurrent STEMI and 22 (11%) patients died **(Table 9).**

Patients were classified into two groups:

Group I: 172 patients (81.9%) presented with acute coronary syndrome but without pulmonary edema.

Group II: 38 Patients (18.1%) presented with cardiogenic pulmonary edema due to underlying acute coronary syndrome.

A) Baseline demographic parameters of both groups:

Table (1): Age and sex distribution:

Parameter	Group I (n=172)	Group II (n=38)	P-value
Age			0.072
Range years	39 – 77 years	42 – 72 years	
(Mean ± SD)	55.1 ± 9.1	59 ± 7.7	
Sex (n, %) **Males** **Females**	 103 (59.9%) 69 (40.1%)	 24 (63.2%) 14 (36.8%)	0.709

n=number, SD= standard deviation.

This table shows that both groups had nearly similar age and sex distribution.

Table (2): Prevalence of coronary risk factors:

Parameter	Group I (n=172)	Group II (n=38)	P-value
HTN, n (%)	100 (58.1)	28 (73.7)	0.001*
DM, n (%)	55 (32)	26 (68.4)	0.000 *
Smoking, n (%)	70 (40.7)	18 (47.4)	0.451
Dyslipidemia, n (%)	96 (55.8)	16 (42.1)	0.125
Prior MI, n (%)	42 (24.4)	22 (57.9)	0.000 *

* Significant, HTN=hypertension, DM=diabetes mellitus.
MI= myocardial infarction.

This table shows that group II had higher prevalence of coronary risk factors studied except for hyperlipidemia. The differences between the two groups as regard hypertension, diabetes mellitus and prior MI were statistically significant ($p<0.05$).

B) Baseline clinical data of both groups:

Table (3): Distribution of ACS subtypes:

Parameter	Group I (n=172)	Group II (n=38)	Total n (%)	P-value
STEMI, n (%)	74 (88.1)	10 (11.9)	84 (100)	0.001*
NSTEMI, n (%)	49 (76.6)	15 (23.4)	64 (100)	0.001*
UA, n (%)	49 (79)	13 (21)	62 (100)	0.001*

* Significant, STEMI= ST-segment elevation myocardial infarction, NSTEMI= non ST-segment elevation myocardial infarction, UA= unstable angina.

This table shows that one-tenth (11.9%) of patients with STEMI, one-fourth (23.4%) of patients with NSTEMI and one-fifth (21%) of patients with UA had complicating ACPE on admission.

Although the frequency of STEMI is the highest among the studied population, it showed the least incidence of complicating ACPE. The highest ACPE was found among patients presented with NSTEMI followed by UA. The differences between both groups as regard ACPE were highly statistically significant ($p<0.05$).

Table (4): On admission clinical, laboratory and chest-radiography of both groups:

Parameter	Group I (n=172)	Group II (n=38)	P-value
SBP (Mean ± SD) mmHg	129.1 ± 19.9	146.3 ± 32.5	0.003*
HR (Mean ± SD) bpm	88.1 ± 16.8	118.1 ± 14.5	0.000*
Significant arrhythmia, n (%)	18 (10.5)	13 (34.2)	0.001*
LBBB, n (%)	2 (1.2)	13 (34.2)	0.000*
Peak CK-MB	128.7 ± 107.4	92.3 ± 80.2	0.021*
Hypoxia, n (%)	8 (4.7)	15 (39.5)	0.001*
Cardiomegally, n (%)	40 (23.2)	19 (50)	0.000*
Lung congestion, n (%)	0 (0)	37 (97.4)	0.000*

* Significant, SBP=systolic blood pressure in mmHg, HR= heart rate (beat per minute). Significant arrhythmias (PVCs, VT and AF). LBBB= left bundle branch block. CK-MB= creatin kinase myocardial band.

This table shows that, on admission group II patients had significant higher means of SBP, HR and higher incidence of arrhythmias (PVCs, AF, VT), LBBB, hypoxia, cardiomegally and lung congestion than group I patients. On the other hand group II had lower peak CK-MB than group I. All differences between both groups described above were statistically significant ($p<0.05$).

Table (5): Trans-thoracic echo-Doppler data of both groups:

Parameter	Group I (n=172)	Group II (n=38)	P-value
EF			
< 45% n (%)	40 (23.2)	32 (84.2)	0.001*
(Mean ± SD)	55.1 ± 5.5	44.8 ± 6.9	0.001*
SWMA at rest, n (%)	107 (62.2)	26 (68.4)	0.472
Diastolic dysfunction, n (%)	12 (7)	6 (15.8)	0.079
LVH, n (%)	23 (13.4)	15 (39.5)	0.001*
MR, n (%)	23 (13.4)	18 (47.4)	0.001*

* Significant, EF= percentage ejection fraction, SWMA= systolic wall motion abnormalities, LVH= left ventricle hypertrophy, MR= mitral regurge.

This table shows that group II had higher percentage of patients who showed depressed global left ventricular systolic functions (EF < 45%), left ventricular diastolic dysfunction, segmental wall motion abnormalities at rest (SWMA), mitral regurge (MR) and left ventricular hypertrophy (LVH) compared to group I. The differences between both groups as regard EF, LVH and MR were statistically significant ($p<0.05$).

Table (6): In-hospital events of both groups:

Parameter	Group I (n=172)	Group II (n=38)	P-value
Thrombolytic reception, n (%)	61 (35.5)	11 (28.9)	0.064
Major arrhythmias (AF, VT, HB), n (%)	12 (7)	16 (42.1)	0.001*
Recurrent ACPE, n (%)	0 (0)	7 (18.4)	NA*
Heart failure, n (%)	0 (0)	4 (10.5)	NA*
Recurrent angina, n (%)	7 (4.1)	3 (7.9)	0.162
Re-infarction, n (%)	5 (2.9)	4 (10.5)	0.001*
Cardiogenic shock, n (%)	9 (5.2)	11 (28.9)	0.001*
Death, n (%)	6 (3.5)	5 (13.1)	0.032*

* Significant, NA= not applicable, AF=atrial fibrillation, VT=ventricular tachycardia HB=heart block, ACPE=acute cardiogenic pulmonary edema.

This table shows that group II had higher incidence of morbidity and mortality during hospital admission compared to group I. Recurrent MI, major arrhythmias and cardiogenic shock were the most common causes of death and the differences in their incidence between both groups were statistically significant ($p<0.05$).

Table (7): Diagnostic coronary angiography of both groups:

Parameter	Group I (n=166)	Group II (n=33)	P-value
One-vessel disease, n (%)	56 (33.7)	1(3)	0.0001*
Two–vessel disease, n (%)	53 (32.1)	4 (12.1)	0.0001*
Multi-vessel disease, n (%)	57 (34.5)	29 (87.8)	0.0001*

* Significant

Coronary angiography was not done to 11 (5.2%) patients because of early hospital death. This table shows that in group I, the incidence of one-vessel, two-vessel and multi-vessel disease were nearly equally distributed while in group II, most patients (85.3%) had multi-vessel disease compared to only (34.5%) of group I. The differences between groups were highly significant ($p<0.0001$).

Table (8): Coronary revascularization procedures of both groups:

Parameter	Group I (n=166)	Group II (n=33)	P-value
PCI, n (%)	42 (25)	7 (21.2)	0.468
CABG, n (%)	8 (5)	4 (12.1)	0.112

* PCI=percutaneous coronary intervention, CABG=coronary artery bypass grafting.

This table shows that the frequency of doing PCI were lower while the frequency of doing CABG was higher in group II patients compared to group I.

Table (9): Three-month cardiac morbidity and mortality among both groups:

Parameter	Group I (n=166)	Group II (n=33)	P-value
Recurrent ACPE, n (%)	0 (0)	10 (30.3)	NA*
Heart failure, n (%)	0 (0)	9 (27.2)	NA*
Recurrent angina, n (%)	19 (11)	8 (24.2)	0.012*
Re-infarction, n (%)	25 (15.1)	10 (30.3)	0.001*
Death, n (%)	15 (9)	7 (21.2)	0.001*

* Significant, NA= not applicable, ACPE=acute cardiogenic pulmonary edema.

This table shows that group II had significantly higher rates of cardiac morbidity and mortality during the follow up period. The highest rate of mortality was found among patients with STEMI. The differences between both groups as regard recurrent ACS and death were statistically significant ($p<0.05$).