Results

➢ Study Population:

Between September 2009 and February 2010, 100 consecutive patients with acute coronary syndrome, admitted to the CCU at Benha University Hospital were included in this study. The mean age was 58±9 years (range: 39 to 82 years). Thirty four percent were females, while 66% were males (Table 2). The diagnosis was STEMI in 38 (38%) patients, NSTEMI in 11(11%) patients, and unstable angina in 51(51%) patients (Figure 4,5).

Table 2. Baseline characteristics of study population.

Variables	N=100
Age (years):	
Mean±SD	58±9
Sex: n (%)	
Females	34 (34%)
Males	66 (66%)
(BMI): kg/m^2	
Mean±SD	33±10
Waist/hip ratio:	
Mean±SD	1.00±0.1

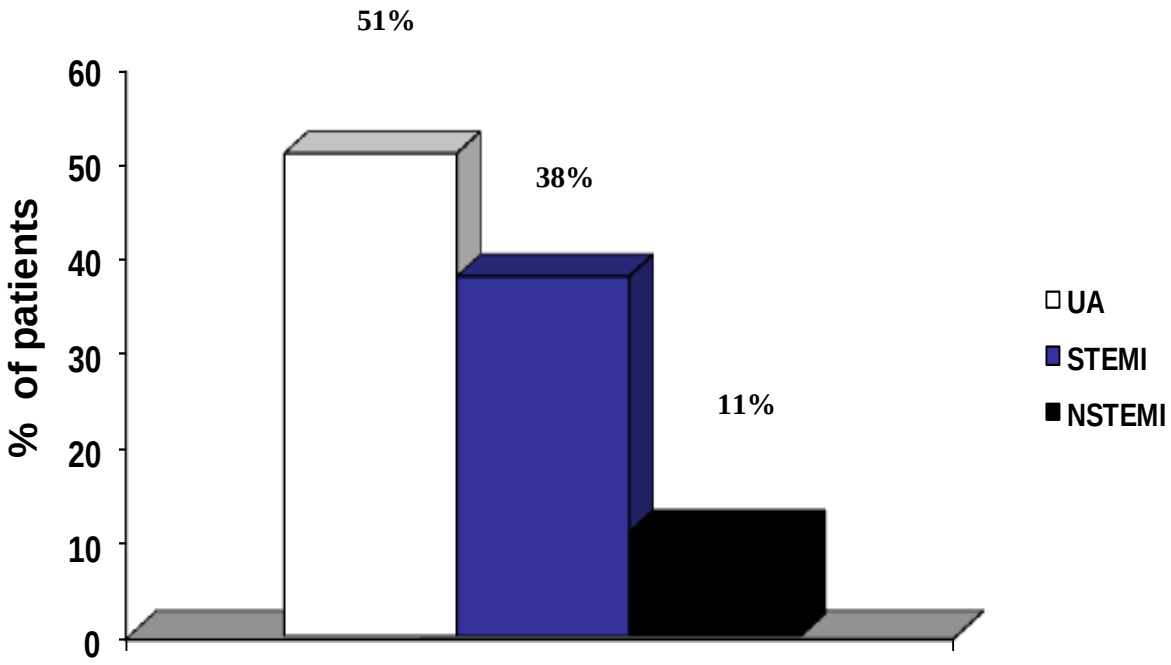

Figure (4): Diagnosis in study population.

UA: unstable angina,

STEMI: ST segment elevation myocardial infarction,

NSTEMI: Non ST segment elevation myocardial infarction

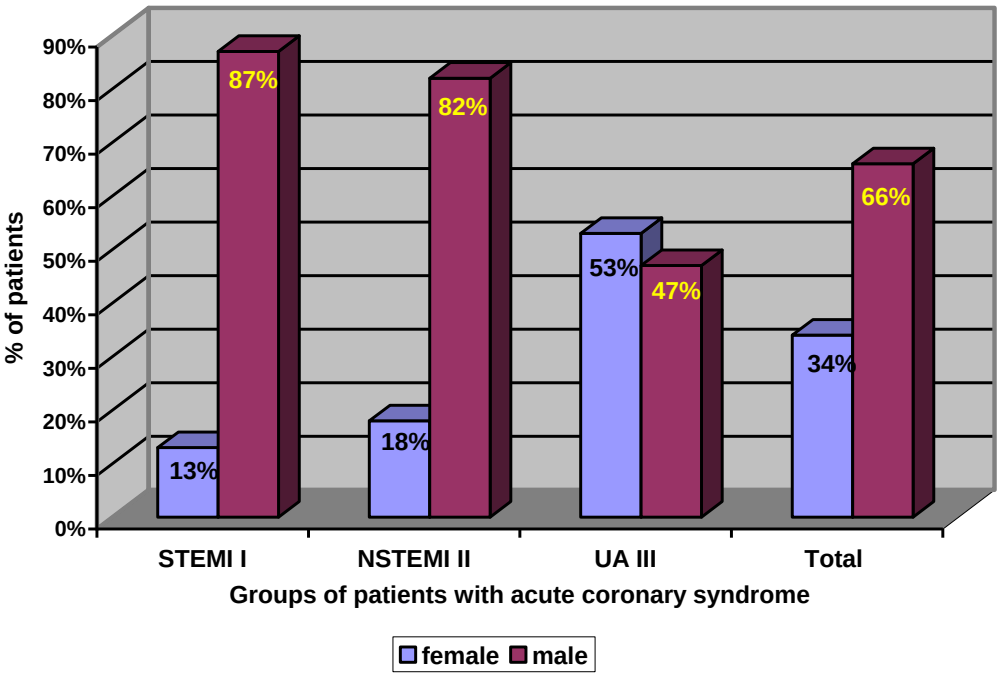

Figure (5):Gender distribution in different groups.

➢ Profile of risk factors and past medical history in study population

Fifty three patients (53%) were current smokers, 12% were former smokers (stopped smoking for at least 6 months before the study). Forty two patients were diabetics (42%), of whom 23 patients (23%) had type I diabetes mellitus and 19 patients (19%) had type II diabetes mellitus. Fifty patients (50%) had history of systemic hypertension. Dyslipidemia was present in 51% of the whole study population. Twenty two patients (22%) had family history of coronary artery disease. Obesity (defined as BMI>30kg/m^2) was detected in 44% of patients. Looking to the past medical history, 14 patients (14%) had a past history of STEMI. Forty two patients (42%) had a past history of chronic stable angina. Six patients (6%) had a history of prior percutanous coronary intervention (PCI). Four patients (4%) had a past history of congestive heart failure. (Table 3, Figure 6).

Table (3): Risk factors and past medical history among the whole study population.

Variables	n=100	
	n	%
Risk factors of IHD		
Smoking:		
Current	53	53%
Former	12	12%
No	35	35%
Diabetes Mellitus (DM)		
No	58	58%
Type I DM	23	23%
Type II DM	19	19%
Hypertension:		
No	50	50%
Yes	50	50%
Dyslipidemia:		
No	49	49%
Yes	51	51%
Family history of IHD:		
No	78	78%
Yes	22	22%
Obesity:		
No	56	56%
Yes	44	44%
Past medical history:		
Prior myocardial infarction:		
No	86	86%
STEMI	14	14%
NSTEMI	0	0
Prior angina pectoris:		
No	58	58%
Yes	42	42%
PCI:		
No	94	94%
Yes	6	6%
CHF:		
No	96	96%
Yes	4	4%
CABG:		
No	100	100%

DM = Diabetes Mellitus. **PCI** = Percutaneous Coronary Intervention.
CABG = Coronary Artery Bypass Grafting. **IHD** = Ischemic Heart Disease.
CHF = Congestive Heart Failure.

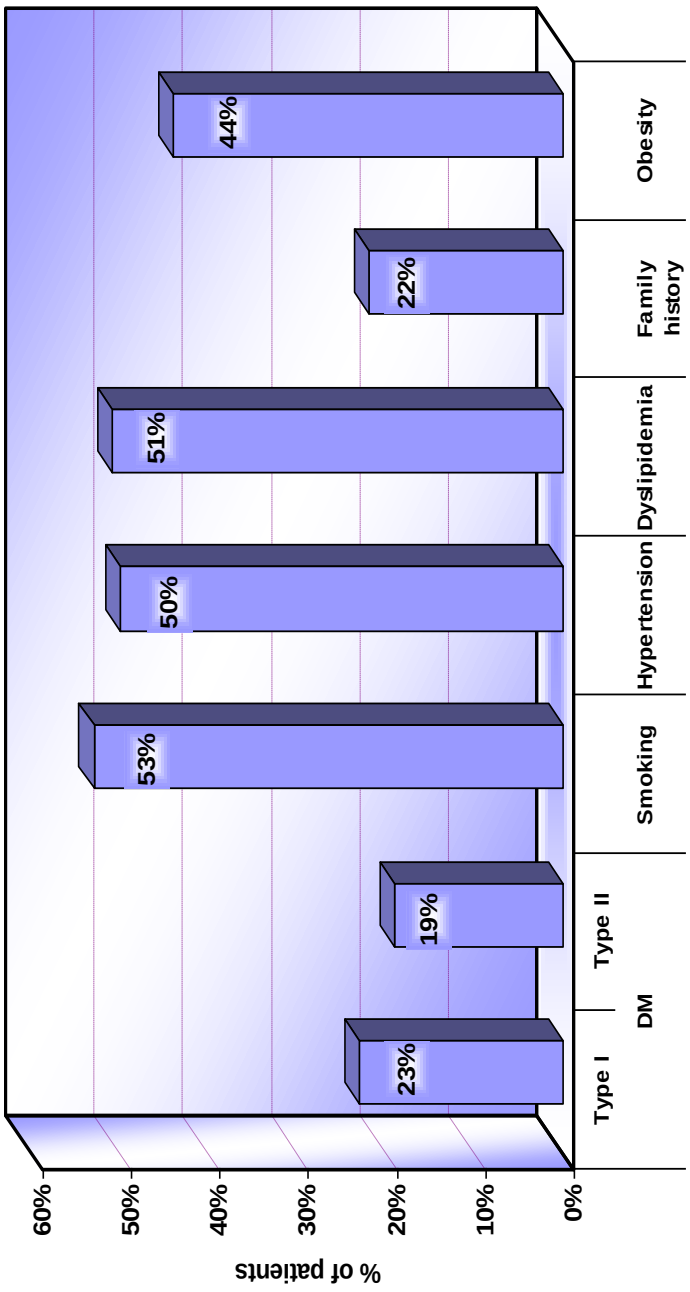

Figure (6): Risk factors among patients with acute coronary syndrome.

➢ Baseline characteristics in different categories of patients

The mean age in patients presented with STEMI was 57±9 years (range: 42-75 years), 58±7 years in the NSTEMI patients (range: 47-71 years), and 58±10 years in the UA patients (range: 39-82 years), (p= 0.9). The majority of STEMI patients were male (87%), the NSTEMI group included 2 female patients (18%) and 9 male patients (82%), while the UA group included 27 female patients (53%) and 24 male patients (47%), (p=0.0001). BMI in the STEMI group ranged between 24-53 kg/m^2 (mean: 33±8), 23-60 kg/m^2 (mean 31±10) in the NSTEMI group, and 20-65 kg/m^2 (mean 36±11) in the UA group (p=0.004). Waist/hip ratio in the STEMI group ranged from 0.93-1.13 with mean 1±0.05, from 0.92-1.14 with mean 1.00±0.07 in the NSTEMI group, and from 0.85-1.90 with mean 0.99±0.14 in the UA group**,** (p= 0.9). (Table 4).

Table (4): Baseline characteristics of the different groups of the studied patients.

	n=100						P
	STEMI I (n = 38)		NSTEMI II (n = 11)		UA III (n = 51)		
	n	%	n	%	n	%	
Age (Years) :							
Mean ± SD	57±9		58±7		58±10		0.957
Sex:							
Females	5	13%	2	18%	27	53%	0.0001*
Males	33	87%	9	82%	24	47%	
Body Mass Index							
(BMI):							
Mean ± SD	33±8		31±10		36±11		0.004*
Waist/Hip Ratio:							
Mean ± SD	1.00±0.05		1.00±0.07		0.99±0.14		0.941

***Significant= P<0.05**

STEMI=ST elevation myocardial infarction

NSTEMI=Non ST elevation myocardial infarction

UA=Unstable angina

➢ Risk factors and past medical history in different categories of patients

In the STEMI group, 29 patients (76%) were current smokers, 73% in the NSTEMI group, and 31% in the UA group (p= 0.0001). Fifteen patients (39 %) had history of Diabetes mellitus in the STEMI group, of whom 18% had type I diabetes mellitus and 21% had type II diabetes mellitus. In the NSTEMI patients, only 4 patients (36%) had type I diabetes mellitus. Twenty three patients (45%) were diabetics in the UA group, of whom 24% had type I diabetes mellitus and 22% had type II diabetes mellitus. (p = 0.442).

Eleven patients (29%) in the STEMI group,6 patients (55%) in the NSTEMI group, and 33 patients (65%) in UA the group had history of systemic hypertension(p= 0.004). Sixteen patients (42%) in the STEMI group, 5 patients (46%) in the NSTEMI group, and 30 patients (59%) in the UA group were dyslipidemic (p= 0.274. The positive family history of IHD was present in 6 patients (16%) in the STEMI group, in 4 patients (36%) in the NSTEMI group, and in 12 patients (24%) in the UA group (p=0.325)**.** In the STEMI group, 12 patients (32%) were obese (BMI>30kg/m^2), compared to 36% in the NSTEMI group, and 55% in the UA group(p=0.078).

History of prior myocardial infarction was present in 2 patients (5%) in the STEMI group, 3 patients (27%) in the NSTEMI, and in 9 patients (18%)in the UA group(p=0.101). Prior angina was reported in 12 patients (32%) in the STEMI group, 4 patients (36%) in the NSTEMI, and in 26 patients (51%) in the UA group(p=0.172). Prior PCI was done to 1 patient (3%) in the STEMI group, 5 patients (10%) in the UA group (p=0.250), while non of the NSTEMI patients had prior intervention. Past history of congestive heart failure was present in 4 patients (8%) in the UA group only. (Table 5, Figure 7,8).

Table (5): Risk factors and past medical history in different categories of patients with ACS.

Variables	Patients with acute coronary syndrome (n = 100)						P
	STEMI I (n = 38)		NSTEMI II (n = 11)		UAIII (n = 51)		
	n	%	n	%	n	%	
Risk factors of IHD							
Smoking:							
Current	29	76%	8	73%	16	31%	0.0001*
Former	5	13%	0	0	7	14%	
No	4	11%	3	27%	28	55%	
DM:							
No	23	61%	7	64%	28	55%	0.442
Type I DM	7	18%	4	36%	12	24%	
Type II DM	8	21%	0	0	11	22%	
Hypertension:							
No	27	71%	5	46%	18	35%	0.004*
Yes	11	29%	6	55%	33	65%	
Dyslipidemia:							
No	22	58%	6	56%	21	41%	0.274
Yes	16	42%	5	46%	30	59%	
Family history of IHD:							
No	32	84%	7	64%	39	77%	0.325
Yes	6	16%	4	36%	12	24%	
Obesity:							
No	26	68%	7	64%	23	45%	0.078
Yes	12	32%	4	36%	28	55%	
Past medical history:							
Prior myocardial infarction:							
No	36	95%	8	73%	42	82%	0.101
STEMI	2	5%	3	27%	9	18%	
NSTEMI	0	0	0	0	0	0	
Prior angina:							
No	26	68%	7	64%	25	49%	0.172
Yes	12	32%	4	36%	26	51%	
PCI:							
No	37	97%	11	100%	46	90%	0.250
Yes	1	3%	0	0	5	10%	
CABG:							
No	38	100%	11	100%	51	100%	-
CHF:							
No	38	100%	11	100%	47	92%	0.135
Yes	0	0	0	0	4	8%	

*Significant = P<0.05 STEMI=ST elevation myocardial infarction DM=Diabetes mellitus.
NSTEMI = Non ST elevation myocardial infarction UA=Unstable angina PCI=Percutanous coronary intervention.
CHF=Congestive heart failure. CABG=coronary artery bypass graft. IHD=Ischemic heart disease.

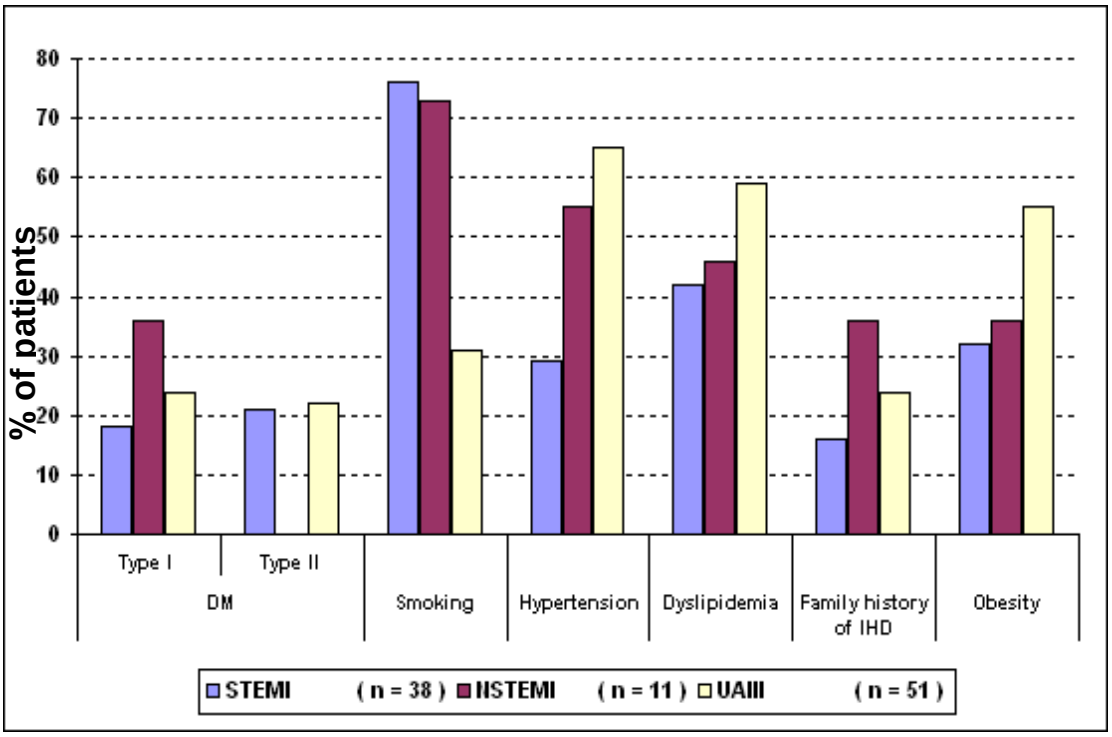

Figure (7): Risk factors among different groups of patients with acute coronary syndrome.

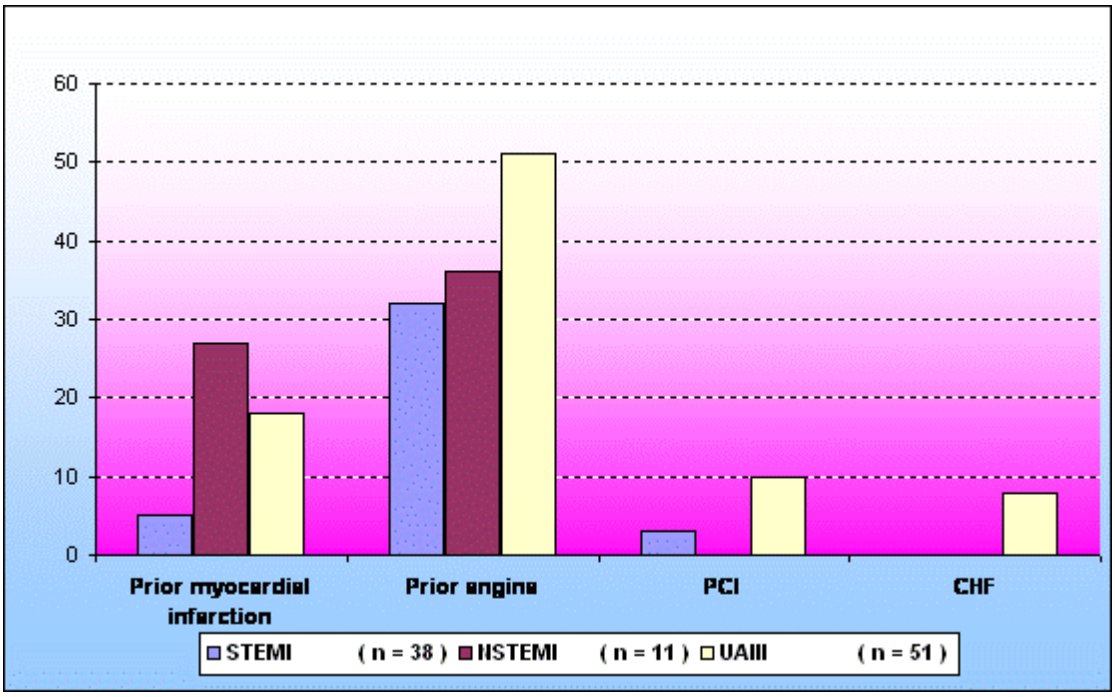

Figure (8): Past medical history among different groups of the studied patients with acute coronary syndrome.

- **Clinical presentations among the studied patients with acute coronary syndrome.**

Chest pain was the main presenting symptom in 98% of patients (STEMI 97%,NSTEMI 100%,UA 98%), (p= 0.860). Fifty six patients (56%) presented with dyspnea (STEMI 53%, NSTEMI 54%, UA 59%), (p= 0.840). Five patients(5%) had pulmonay oedema (STEMI 5%, NSTEMI 9%, UA 4%), (p =0.772). Eighteen patients(18%) presented with palpitation (STEMI 21%, NSTEMI 9%, UA 18%), (p =0.658). Thirty four patients(34%) presented with vomiting (STEMI 47%, NSTEMI 9%, UA 29%) (p= 0.038). Five patients (5%) had syncope (STEMI 8%, NSTEMI 9%,UA 2%), (p =0.359). (Table 6).

Table (6): Clinical presentations among the studied patients with acute coronary syndrome.

Clinical Presentations	TOTAL (n = 100)		n=100 STEMI I (n = 38)		NSTEMI II (n = 11)		UA III (n = 51)		P
	n	%	n	%	n	%	n	%	
Chest pain:									
No	2	2%	1	3%	0	0	1	2%	0.860
Yes	98	98%	37	97%	11	100%	50	98%	
Dyspnea:									
No	44	44%	18	47%	5	46%	21	41%	0.840
Yes	56	56%	20	53%	6	54%	30	59%	
Pulmonary edema:									
No	95	95%	36	95%	10	91%	49	96%	0.772
Yes	5	5%	2	5%	1	9%	2	4%	
Palpitation:									
No	82	82%	30	79%	10	91%	42	8%	0.658
Yes	18	18%	8	21%	1	9%	9	18%	
Sweating:									
No	47	47%	15	40%	8	73%	24	47%	0.151
Yes	53	53%	23	61%	3	27%	27	53%	
Vomiting:									
No	66	66%	20	53%	10	91%	36	71%	0.038*
Yes	34	34%	18	47%	1	9%	15	29%	
Syncope:									
No	95	95%	35	92%	10	91%	50	98%	0.359
Yes	5	5%	3	8%	1	9%	1	2%	

***Significant = P<0.05**
STEMI=ST elevation myocardial infarction
NSTEMI=Non ST elevation myocardial infarction
UA=Unstable angina

➢ Laboratory findings among the studied patients with acute coronary syndrome.

Creatine Kinase MB enzyme was elevated 2 folds above upper reference of normal value in 49 patients (49%), (which represent 100% STEMI group, 100% of the NSTEMI group).Cardiac Troponin T was positive in 48 patients (48%) (38% of the STEMI group, 82% of the NSTEMI group and 2% of the UA group) (p= 0.0001).

The mean serum cholestrol level was 196±53 mg% (range from 90-320). In the STEMI group the mean was 188±55 mg%(range from 90-320), in the NSTEMI the mean was 194±52 mg% (range from 91-275), in the UA the mean was 203±52 mg% (range from 98-320) (p= 0.451).

The mean serum triglycerides was 162±70 mg% (range from 60-365).In the STEMI group the mean was 150±73 mg% (range from 60-365), in the NSTEMI group the mean was 149±67 mg% (range from 60-280), and in the UA group the mean was 173±68 mg% (range from 66-365) (p= 0.264).

The mean high density lipoproteins (HDL)was 47±13 mg% (range from 16-76) in all patients. In the STEMI group the mean was 49±16 mg% (range from 16-70).In the NSTEMI group the mean was 52±18 mg% (range from 34-76). In the UA group the mean was 45±12 mg% (range from 17-68) (p=0.499).The mean low density lipoprotiens was 122±50 mg% (range from 34-213). In the STEMI group the mean was 125±55 mg% (range from 34-212). In the NSTEMI group the mean was124±29 mg% (range from 81-141) and in the UA group the mean was 120±51 mg% (range from 37-213) (p=0.951). The mean serum glucose was 177±85 mg% (range from 71-551).In the STEMI group the mean was 190±103 mg% ranging from 71-551. In the NSTEMI group the mean was 196±62 mg% (range from 98-297). In the UA group with mean was 162±73 mg% (range from 82-44) (p= 0.235). (Table 7).

Table (7): Laboratory findings among the studied patients with acute coronary syndrome.

Variables		Patients with acute coronary syndrome (n = 100)								P
		TOTAL (n = 100)		STEMI I (n = 38)		NSTEMI II (n = 11)		UA III (n = 51)		
		n	%	n	%	n	%	n	%	
Markers	**CK-MB**									
	+ve	49	49%	38	100%	11	100%	0	0	0.0001*
	-ve	51	51%	0	0	0	0	51	100%	
	Cardiac Troponin									
	+ve	48	48%	38	100%	9	82%	1	2%	0.0001*
	-ve	52	52%	0	0	2	18%	50	98%	
Lipid Profile	**Total Cholesterol (mg%)**									
	Mean ± SD	196±53		188±55		194±52		203±52		0.451
	Serum Triglycerides (mg%)									
	Mean ± SD	162±70		150±73		149±67		173±68		0.264
	HDL (mg%)									
	Mean ± SD	47±13		49±16		52±18		45±12		0.499
	LDL (mg%)									
	Mean ± SD	122±50		125±55		124±29		120±51		0.951
Bl-glucose	**(mg%)**									
	Mean ± SD	177±85		190±103		196±62		162±73		0.235

***Significant =P<0.05**
STEMI=ST elevation myocardial infarction
NSTEMI=Non ST elevation myocardial infarction
UA=Unstable angina
HDL=High density lipoprotiens
LDL=Low density lipoprotiens

➢ In-Hospital investigations.

- Electrocardiography (ECG).

ST segment elevation was present in 38 patients (38%). ST depression was present in 32% of patients (91% of the NSTEMI group and 43% of the UA group). T wave inversion was present in 17% of patients, 9% of the NSTEMI group and 31% of the UA group.

- Echocardiography.

The mean ejection fraction in all patients was 54 ±12% (range from 34-85). In the STEMI group the mean was 52 ±12% (range from 34-82). In the NSTEMI group the mean was 55 ±9% (range from 40-75), and 56±12% (range from 35-85) in the UA group (p=0.196).

- Coranary angiography.

Nine patients (9%) had done coronary angiography, 1 patient had normal coronary vessels in the UA group,2 patients had single vessel disease in the STEMI group. Three patients had 2 vessel disease, two patients in the STEMI group and 1 patient in the UA group. Three patients had 3 vessel disease from the UA group. (Table 8).

Table (8): In-Hospital investigations.

Test	(n = 100)								P
	TOTAL (n =100)		STEMI I (n = 38)		NSTEMI II (n = 11)		UA III (n = 51)		
	n	%	n	%	n	%	n	%	
ECG									
Normal	13	13%	0	0	0	0	13	26%	0.0001*
ST elevation	38	38%	38	100%	0	0	0	0	
ST depression	32	32%	0	0	10	91%	22	43%	
T wave inversion	17	17%	0	0	1	9%	16	31%	
Echocardiography (EF%)									
Range	34-85		34-82		40-75		35-85		0.196
Mean ± SD	54 ±12		52±12		55±9		56±12		
Coronary Angiography									
No	91	91%	34	90%	11	100%	46	90%	0.397
Normal	1	1%	0	0	0	0	1	2%	
Single VD	2	2%	2	5%	0	0	0	0	
2 vessel VD	3	3%	2	5%	0	0	1	2%	
3 vessel VD	3	3%	0	0	0	0	3	6%	

***Significant = P<0.05**

STEMI=ST elevation myocardial infarction

NSTEMI=Non ST elevation myocardial infarction

UA=Unstable angina

EF=Ejection fraction

VD=vessel disease

- **Treatment strategies in different categories of patients.**

Thrombolytic therapy was given to 28 patients in the STEMI group representing (74%). The 26% of patients who didn't receive thrombolytic therapy either presented late or had one of the contraindications to thrombolytic therapy. Heparin was given in 94 patients (94%) of whom 36 patients (76%) in the STEMI group,9 patients (82%) in the NSTEMI group, and 49 patients (92%) in UA group (p = 0.112). Acetyl salicylic acid was taken in 98 patients (98%) of whom 37 patients (97%) in the STEMI group, 11 patients (100%) in the NSTEMI group and in 50 patients (98%) in UA group (p = 0.860).

Clopidogrel was given to 89 patients (89%) ,of whom 35 patients (92%) in the STEMI group,11 patients (100%) in the NSTEMI group and in 43 patients (84%) in UA group (p= 0.237). Eighty one patients (81%) received beta blockers of whom 32 patients (84%) in the STEMI group, 10 patients (91%) in the NSTEMI group and in 39 patients (77%) in UA group (p= 0.441). Sixty one patients (61%) received angiotensin converting enzyme inhibitor (ACEI) of whom 27 patients (71%) in the STEMI group, 7 patients (64%) in the NSTEMI group and in 27 patients (53%) in UA group (p= 0.219). Intropics were given to 2 patients (2%),1 patient (3%) in the STEMI group and 1 patient (2%) in the UA group. Eighty one patients (81%) received nitrates of whom 28 patients(74%) in the STEMI group, 10 patients (91%) in the NSTEMI group and in 43 patients (84%) in UA group (p =0.303).

Fifteen patients (15%) received calcium channel blocker (CCB) of whom 3 patients (8%) in the STEMI group, 4 patients (36%) in the NSTEMI group, and in 8 patients (16%) in UA group (p= 0.065). Eighty nine patients (89%) received statins of whom 37 patients (97%) in the STEMI group, 9 patients (82%) in the NSTEMI group and in 43 patients (84%) in UA group (p = 0.109). Nine patients (9%) received diuretics ,of whom 5 patients (13%) in the STEMI group,1 patients (9%) in the NSTEMI group and in 3 patients (6%) in UA group (p = 0.495). Six patients (6%) had done percutanous coronary intervention (PCI), 3 patients (8%) in the STEMI group and 3 patients (6%) in the UA group (p=0.623). (Table 9).

Table (9): Treatment strategies in different categories of patients.

Management Type	(n = 100) TOTAL (n = 100)		STEMI - I (n = 38)		NSTEMI -II (n = 11)		UA - II (n = 51)		P
	n	%	N	%	n	%	N	%	
Thrombolytic therapy:									
No	72	72%	10	26%	11	100%	51	100%	
Yes	28	28%	28	74%	0	0	0	0	
Heparin:									
No	6	6%	2	24%	2	18%	2	8%	0.112
Yes	94	94%	36	76%	9	82%	49	92%	
ASA									
No	2	25	1	3%	0	0	1	2%	0.860
Yes	98	98%	37	97%	11	100%	50	98%	
Clopidegrel									
No	11	11%	3	8%	0	0	8	16%	0.237
Yes	89	89%	35	92%	11	100%	43	84%	
Beta blockers									
No	19	19%	6	16%	1	9%	12	24%	0.441
Yes	81	81%	32	84%	10	91%	39	77%	
ACEI									
No	39	39%	11	29%	4	36%	24	47%	0.219
Yes	61	61%	27	71%	7	64%	27	53%	
Inotropics									
No	98	98%	37	97%	11	100%	50	98%	0.860
Yes	2	2%	1	3%	0	.0	1	2%	
Nitrates									
No	19	19%	10	26%	1	9%	8	16%	0.303
Yes	81	81%	28	74%	10	91%	43	84%	
CCB									
No	85	85%	35	92%	7	64%	43	84%	0.065
Yes	15	15%	3	8%	4	3%	8	16%	
Statins									
No	11	11%	1	3%	2	18%	8	16%	0.109
Yes	89	89%	37	97%	9	82%	43	84%	
Diuretics									
No	91	91%	33	87%	10	901%	48	94%	0.495
Yes	9	90%	5	13%	1	9%	3	6%	
Emergency PCI									
No	94	94%	35	92%	11	100%	48	94%	0.623
Yes	6	6%	3	8%	0	0	3	6%	
CABG									
No	100	100%	38	100%	11	100%	51	100%	-

***Significant = P<0.05 STEMI=ST elevation myocardial infarction NSTEMI=Non ST elevation myocardial infarction UA=Unstable angina ASA=Acetyl salicylic acid ACEI=Angiotensin converting ezyme inhibitor CCB=Calcium channel blocker PCI=Percutanous coronary intervention. CABG=coronary artery bybass graft.**

➢ In-hospital complications

Four patients (4%) had developed cardiogenic shock of whom 3 patients (8%) in the STEMI group and 1 patient (2%) in the UA group (p=0.285). Pulmonary oedema had developed in 4 patients (4%) of whom 2 patients (5%)in the STEMI,1 patient (9%) in the NSTEMI and one patient (2%) in the UA group (p=0.517). Minor bleeding had occurred in 6 patients (6%) of whom 4 patients (11%) in the STEMI,1 patient (9%) in the NSTEMI and 1 patient (2%) in the UA group (p= 0.218). Resuscitated cardiac arrest had developed in 2 patients from the STEMI group (5%). Atrial fibrillation had developed in 3 patients (3%) of whom 1 patients (3%)in the STEMI, and 2 patient (4%) in the UA group. Ventricular fibrillation had developed in 2 patients (2%) of whom 1 patients (3%) in the STEMI, and 1 patient (2%) in the UA group. Ventricular tachycardia had developed in 7 patients (7%) all from the STEMI group (18%). (Table 10).

Table (10): In-hospital complications occurred among the studied patients with acute coronary syndrome.

Complications	(n = 100)								P
	TOTAL (n = 100)		STEMI I (n = 38)		NSTEMI II (n = 11)		UA III (n = 51)		
	n	%	n	%	n	%	n	%	
Cardiogenic shock									
No	96	96%	35	92%	11	100%	50	98%	0.285
Yes	4	4%	3	7.9%	0	0	1	2%	
Pulmonary edema									
No	96	96%	36	95%	10	91%	50	98%	0.517
Yes	4	4%	2	5%	1	9%	1	2%	
Bleeding									
No	94	94%	34	90%	10	91%	50	98%	0.218
YES	6	6%	4	11%	1	9%	1	2%	
Resuscitated cardiac arrest									
No	98	98%	36	95%	11	100	51	100%	0.189
Yes	2	2%	2	5%	0	0	0	0	
Arrhythmias									
No	88	88%	29	76|%	11	100%	48	94%	0.0001*
AF	3	3%	1	3%	0	0	2	4%	
VF	2	2%	1	3%	0	0	1	2%	
VT	7	7%	7	18%	0	0	0	0	
Failed thrombolytic therapy									
No	100	100%	38	100%	-	-	-	-	-
Myocardial reinfarction									
No	100	100%	38	100%	11	100%	51	100%	-
Mechanical complications									
No	100	100%	38	100%	11	100%	-	-	-
Deaths									
No	100	100%	38	100%	11	100%	51	100%	-

***Significant or P<0.05**
STEMI = ST elevation myocardial infarction
NSTEMI = Non ST elevation myocardial infarction
UA = Unstable angina
AF = Atrial Fibrillation
VF = Ventricular tachycardia
VT = Ventricular fibrillation

➢ Predictors of in-hospital outcome.

Smoking and diabetes mellitus were the only independent predictors of adverse events during hospital admission. The relative risk was 16 for smoking (p= 0.04) and diabetes (p=0.008). (Table 11).

Table (11): Predictors of in-hospital outcome.

Variables	P	OR	95% confidence interval for Exp (B)	
			Lower limit	Upper Limit
• Age	0.6	1.311	0.423	4.061
• Sex	0.2	5.644	0.405	78.713
• Smoking	0.04*	16.016	1.044	245.793
• DM	0.008*	1.162	0.042	1.628
• Hypertension	0.9	1.036	0.344	3.117
• Dyslipidemia	0.9	0.929	0.324	2.661
• Family history	0.9	0.925	0.277	3.092
• Obesity	0.5	1.455	0.457	4.634

OR= Odds Ratio