Results

This prospective, single center study included patients with non ST elevation acute coronary syndrome from the attendants of the coronary care unit at Benha University Hospital during the period from December 2009 till June 2010. During the study period 185 patients were admitted, 27 of them had AF &158 patients had normal sinus rhythm, thus the prevalence of AF was 14.59% ***(figure 8)***. The first 25 patients with non ST elevation ACS and AF were classified as group I & the 1st 25 patients with non ST elevation ACS and sinus rhythm were classified as group II. All patients were followed up for 3 months from the date of admission.

Patient demographics:

Of the 50 patients enrolled during the study period, 26 patients (52%) were males and 24 patients (48%) were females and their age ranged from 40-75 years.

Of the patients with AF, 14 patients (56%) had new-onset AF and 11 patients (44%) had previous AF ***(figure 8)***. The patients with ACS and AF were significantly older than the patients without AF with mean age ["65.2±8.4" years old vs. "57.9±7.5" years old, respectively; *P* value <0. 05] ***(table 7 & figure 9)***.

There was no significant statistical difference between the 2 groups as regarding the sex. Of patients with AF, 11 patients (44%) were males and 14 patients (56%) were females, while of patients without AF, 15 patients (60%) were males and 10 patients (40%) were females (*P* value > 0.05) ***(table 7 & figure 10)***.

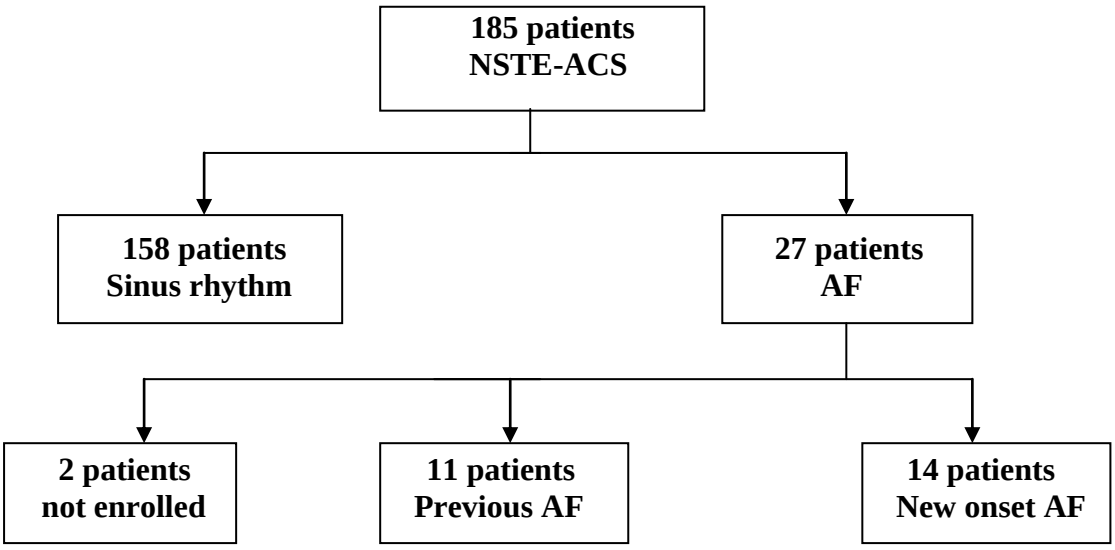

Figure 8: *Distribution of the groups in the study.*

Table (7): *Patient demographic data.*

Group / Parameter		**Group I** (with AF)	**Group II** (without AF)	***P* value**
Age (Mean ± SD)		65.2±8.4	57.9±7.5	<0. 05
Sex	**male**	11 (44%)	15 (60%)	>0. 05
	Female	14 (56%)	10 (40%)	

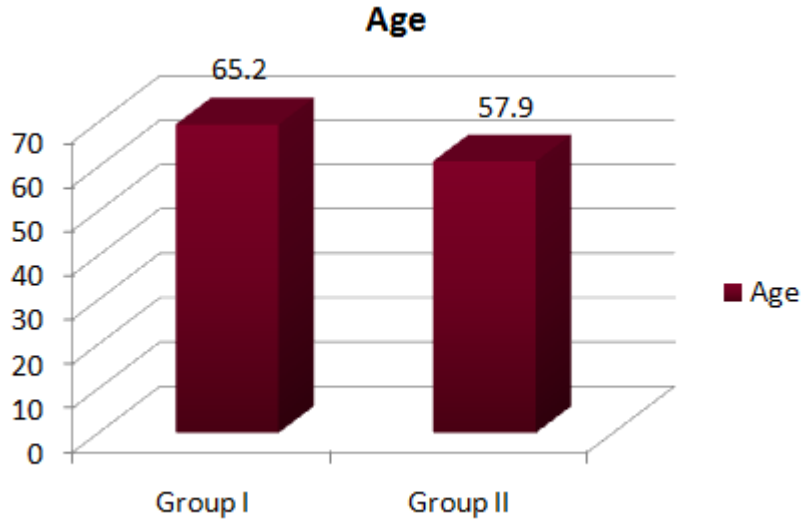

Figure 9: *Patient demographics as regarding the age.*

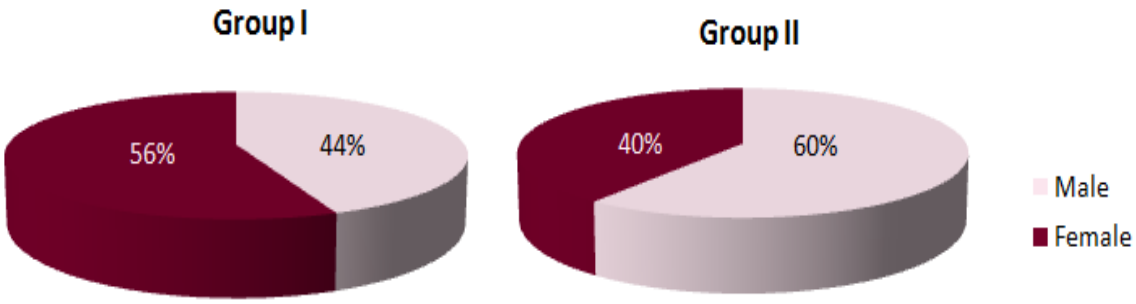

Figure 10: *Patient demographics as regarding the sex.*

Risk factors:

No differences were observed between patients with & those without AF with regard to the risk factors. History of DM was found in 16 patients "64%" of group I vs. 15 patients "60%" of group II. History of HTN was found in 15 patients "60%" of group I vs. 17 patients "68%" of group II. 9 patients "36%"of group I were smokers vs. 8 patients "32%"of group II. 12 patients "48%" of group I were dyslipidemic vs. 9 patients "36%"of group II ***(table 8 & figure 11)***.

Table (8): *Patient risk factors.*

Group / Parameter	Group I (with AF)		Group II (without AF)		χ^2	*P* value
	No.	%	No.	%		
DM	16	64%	15	60%	0.1	>0.05
HTN	15	60%	17	68%	0.1	>0.05
Smoking	9	36%	8	32%	0.1	>0.05
Dyslipidemia	12	48%	9	36%	0.3	>0.05

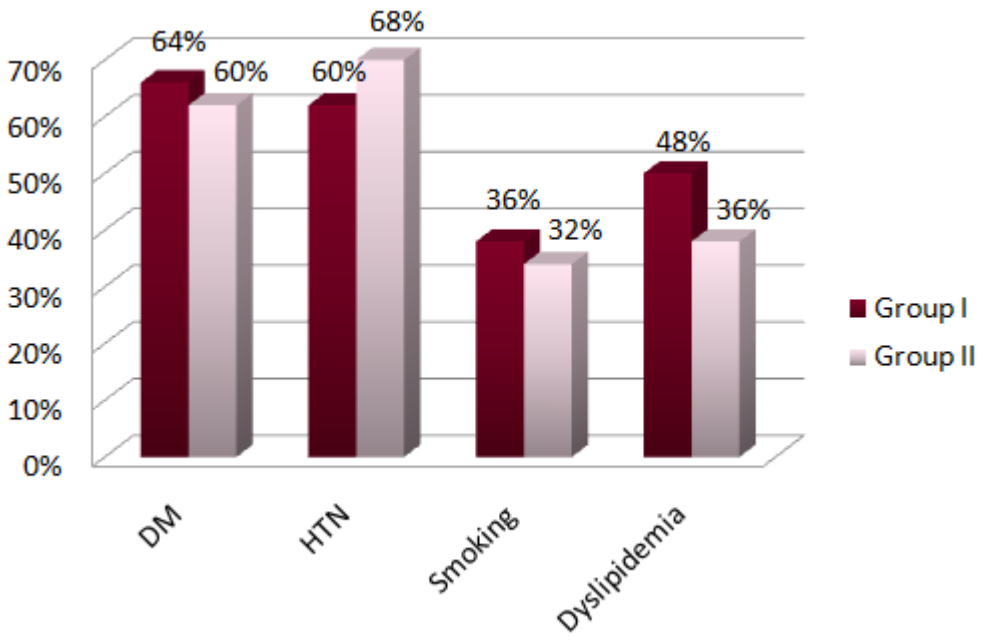

Figure 11: *Patient risk factors.*

Past history:

Patients with AF were more likely to have a prior history of AF, 11 patients (44%) had history of prior AF, while none of the patients without AF had past history of AF, p <0. 001.

Past history of angina, myocardial infarction (MI) & stroke was similar in patients with AF compared with those without AF (13 patients "52%" vs. 12 patients "48%"; 2 patients "8%" vs. 4 patients "16%"; 2 patients "8%" vs. 0%; respectively; p >0. 05). None of the patients of both groups had past history of heart failure (HF).

No differences were found between patients with & without AF as regarding history of prior angioplasty & CABG. Of those without AF 3 patients "12%" had prior angioplasty &1 patient "4%" had prior CABG while none of those with AF had past history of them ***(table 9 & figure 12)***.

Table (9): *Past history.*

Group / Parameter	Group I (with AF)		Group II (without AF)		χ^2	*P* value
	No.	%	No.	%		
Prior angina	13	52%	12	48%	0.1	>0.05
Prior MI	2	8%	4	16%	0.2	>0.05
Prior stroke	2	8%	0	0%	0.5	>0.05
Prior HF	0	0%	0	0%	---	---
Prior AF	11	44%	0	0%	11.5	<0.001
Prior angioplasty	0	0%	3	12%	1.04	>0.05
Prior CABG	0	0%	1	4%	1.02	>0.05

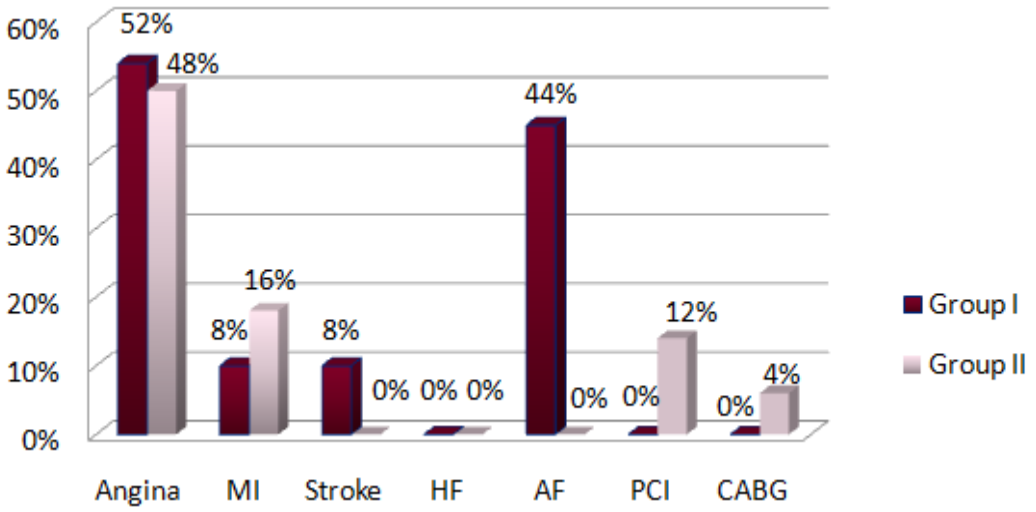

Figure 12: *Past history.*

Clinical characteristics:

At presentation, patients with AF had a significantly greater heart rate (122.92 ± 30.64 vs. 74.28 ± 14.19 bpm; P value <0.001) and worse Killip class (8 patients "32%" vs. 22 patients "88%" had Killip class I, 12 patients "48%" vs. 2 patients "8%"had Killip class II, 5 patients "20%" vs. 1 patient "4%" had Killip class III). No differences were found in both systolic & diastolic blood pressure at presentation (141.6 ± 28.08 vs. 128.4 ± 17.95 mmHg & 88.8 ± 15.89 vs. 82.8 ± 11mmHg; respectively) ***(table 10, 11& figure 13)***.

Table (10): *Clinical data*

Group / Parameter	**Group I** (with AF) **Mean ± SD**	**Group II** (without AF) **Mean ± SD**	**t**	***P* value**
Heart rate	122.92 ± 30.64	74.28 ± 14.19	7.2	<0.001
SBP	141.6 ± 28.08	128.4 ± 17.95	1.9	>0.05
DBP	88.8 ± 15.89	82.8 ± 11	1.5	>0.05

Table (11): *Killip class at presentation*

Group / Killip class	**Group I** (with AF)	**Group II** (without AF)	***P* value**
Class I	8 (32%)	22 (88%)	<0.001
Class II	12 (48%)	2 (8%)	<0.05
Class III	5 (20%)	1 (4%)	>0.05
Class IV	0 (0%)	0 (0%)	

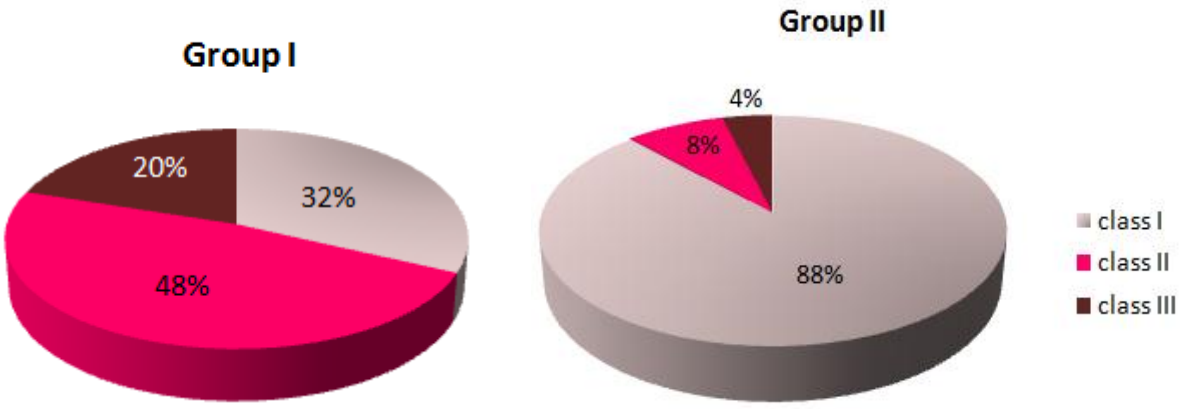

Figure 13: *Killip class at presentation.*

Laboratory tests *(table 12)*:

Table (12): *Laboratory investigations*

Group / Parameter	**Group I** (with AF)	**Group II** (without AF)	**t**	***P* value**
	Mean ± SD	**Mean ± SD**		
Blood urea	30.6 ± 7.01 mg/dl	34.12 ± 13.59mg/dl	1.2	>0.05
Serum creatinine	1.21 ± 0.28 mg/dl	1.14 ± 0.45 mg/dl	0.6	>0.05
Hemoglobin (Hb)	11.74 ± 1.18 g%	12.36 ± 1.43 g%	1.6	>0.05
Random blood sugar	237.64 ±111.05 mg/dl	196.72± 88.07 mg/dl	1.4	>0.05
Na	142.63 ± 5.8 mEq/L	138.65 ± 6.02 mEq/L	0.6	>0.05
K	3.97 ± 0.49 mEq/L	3.93 ± 0.42 mEq/L	0.3	>0.05
Cholesterol	220.24 ± 68.34mg/dl	229.2 ± 53.23mg/dl	0.5	>0.05
Triglycerides (TG)	196.64 ± 80.69mg/dl	201.12 ± 54.53mg/dl	0.2	>0.05
HDL	46.16 ± 8.54 mg/dl	50.68 ± 9.51 mg/dl	1.8	>0.05
LDL	117.44 ± 20.26mg/dl	111.24 ± 12.53mg/dl	1.3	>0.05
CK-MB	53.16 ± 30.36 IU/L	44.32 ± 24.32 IU/L	0.8	>0.05

Type of acute coronary syndrome:

♦ **Group I (Patients with atrial fibrillation):**

- 15 patients (60%) were diagnosed as NSTEMI, while 10 patients (40%) were diagnosed as UA.

♦ **Group II (Patients without atrial fibrillation):**

- 10 patients (40%) were diagnosed as NSTEMI, while 15 patients (60%) were diagnosed as UA ***(table 13& figure 14)***.

Table (13): Type of acute coronary syndrome

Group / Parameter	**Group I** (with AF)		**Group II** (without AF)		***P* value**
	No.	**%**	**No.**	**%**	
NSTEMI	15	60%	10	40%	>0.05
UA	10	40%	15	60%	

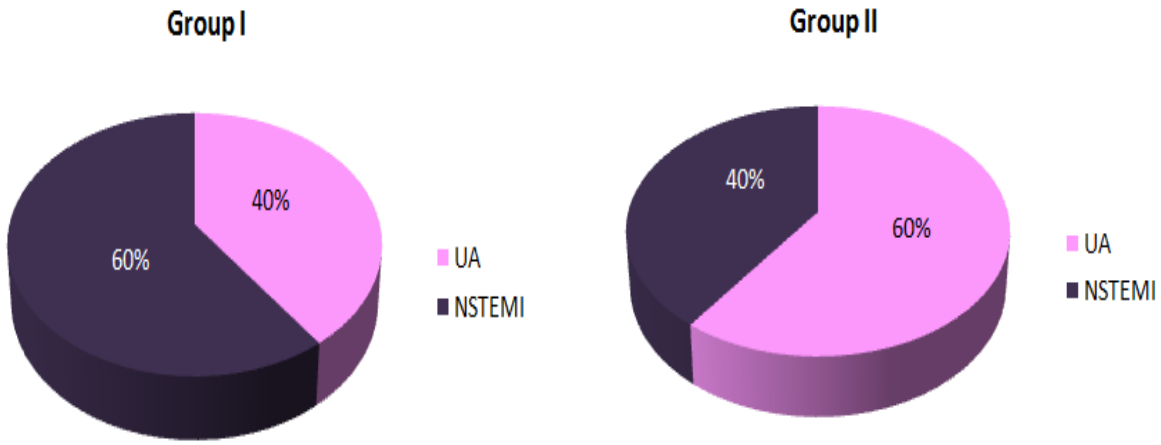

Figure 14: Type of acute coronary syndrome.

Electrocardiographic (ECG) findings *(table 14)*:

♦ **Group I (Patients with atrial fibrillation):**

17 patients (68%) had ischemic changes, 4 patients (16%) had right bundle branch block (RBBB), while 4 patients (16%) had no abnormality apart from AF.

♦ **Group II (Patients without atrial fibrillation):**

17 patients (68%) had ischemic changes, 2 patients (8%) had left ventricular hypertrophy, 1 patient (4%) had RBBB, while 5 patients (20%) had normal ECG.

There was no significant statistical difference between the 2 groups as regarding the ECG findings (*P* value > 0.05).

Table (14): *ECG findings*

Group / ECG	Group I (with AF)	Group II (without AF)	χ^2	*P* value
Ischemic changes	17 (68%)	17 (68%)	---	---
LVH	0 (0%)	2 (8%)	0.5	>0.05
RBBB	4 (16%)	1 (4%)	0.9	>0.05
Normal	4(16%) apart from AF	5 (20%)	0.3	>0.05

Echocardiographic parameters:

Compared with patients with ACS who did not have AF, Patients with AF had greater Left ventricular end-systolic diameter (LVESD) (4.44 ± 0.80423, p <0.001), Left ventricular end-diastolic diameter (LVEDD) (5.73 ± 0.61, p <0.001) & Left atrial diameter (LAD) (4.37 ± 0.55, p <0.001). Patients with AF had significantly lower EF% (44.04 ±

13.29 vs. 56.62 ± 13.85, p <0.01) & greater Wall motion score index (WMSI) (1.45 ± 0.29 vs. 1.09 ± 0.08622, p <0.001) ***(table 15& figure15, 16, 17)***.

Compared with patients without AF, those with AF had higher grades of LV diastolic dysfunction. Of patients with AF, 9 patients (36%) had grade I diastolic dysfunction, 2 patients (8%) had grade II diastolic dysfunction and 7 patients (28%) had grade III diastolic dysfunction. Unfortunately, diastolic function couldn't be assessed in 6 patients who had persistent AF. While of those without AF8 patients (32%) had normal LV diastolic function, 16 patients (64%) had grade I diastolic dysfunction, while 1 patient (4%) had grade II diastolic dysfunction ***(table 16 & figure 18)***.

Table (15): *Echo parameters*

Group / Parameter	**Group I** (with AF)	**Group II** (without AF)	**t**	***P* value**
	Mean ± SD	**Mean ± SD**		
LVESD	4.44 ± 0.80423	3.32 ± 0.39686	6.2	<0.001
LVEDD	5.73 ± 0.61	4.84 ± 0.44	5.8	<0.001
LVEF	44.04 ± 13.29	56.62 ± 13.85	3.2	<0.01
LAD	4.37 ± 0.55	3.57 ± 0.46	5.5	<0.001
WMSI	1.45 ± 0.29	1.09 ± 0.08622	5.8	<0.001

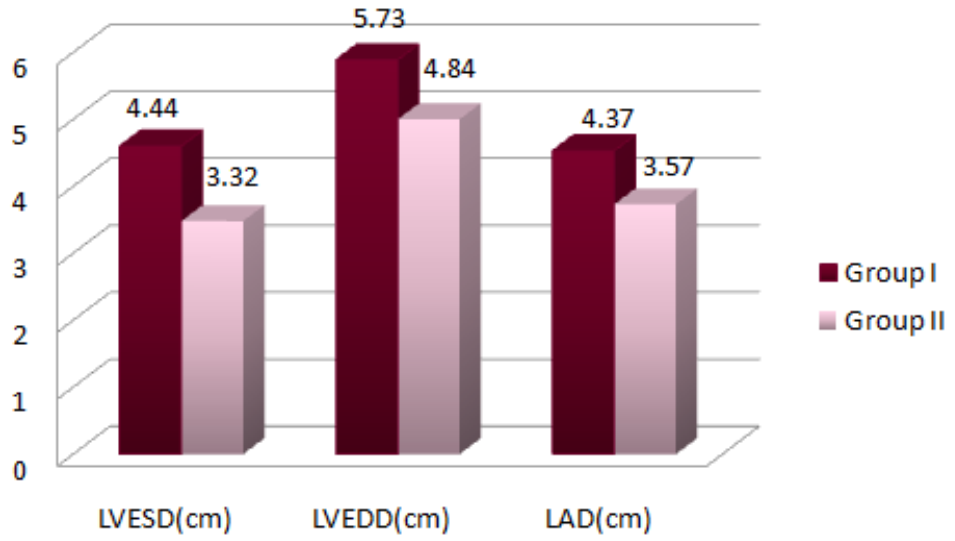

Figure 15: *LVESD, LVEDD & LAD.*

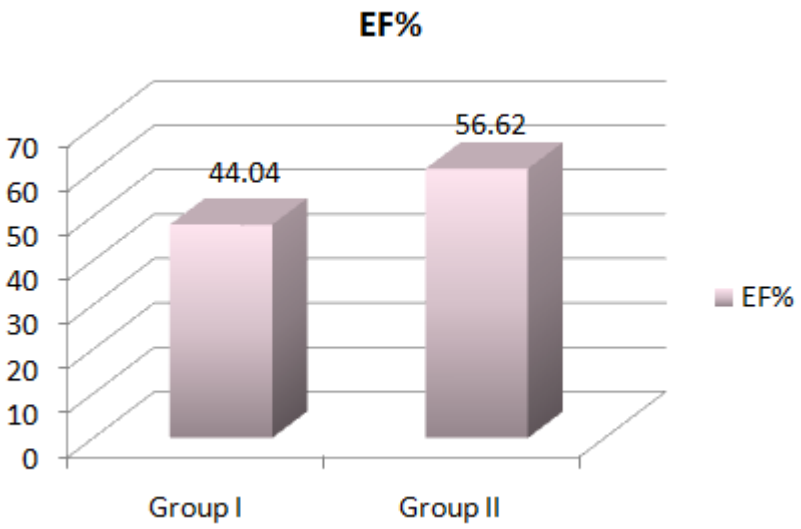

Figure 16: *LV EF%.*

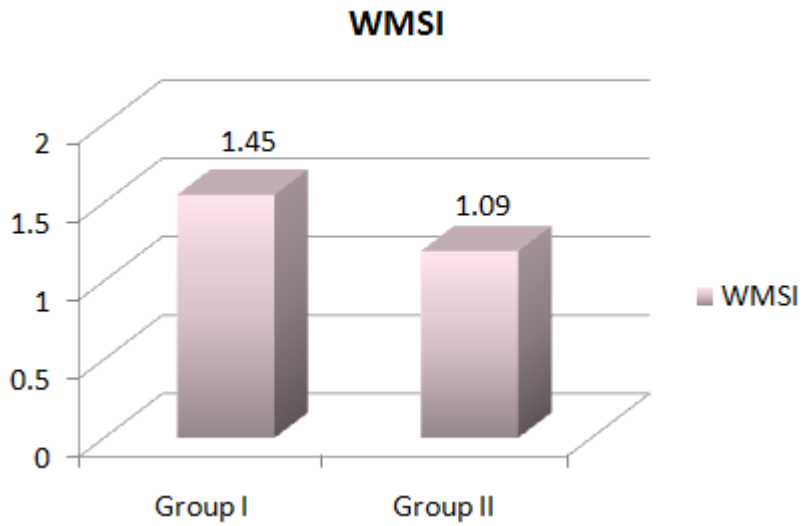

Figure 17: *WMSI.*

Table (16): *LV diastolic function*

Group / Parameter	**Group I** (with AF)		**Group II** (without AF)		χ^2	***P* value**
	No.	**%**	**No.**	**%**		
Normal	0	0%	8	32%	10.3	<0.01
Grade I	9	36%	16	64%		
Grade II	2	8%	1	4%		
Grade III	7	28%	0	0%		

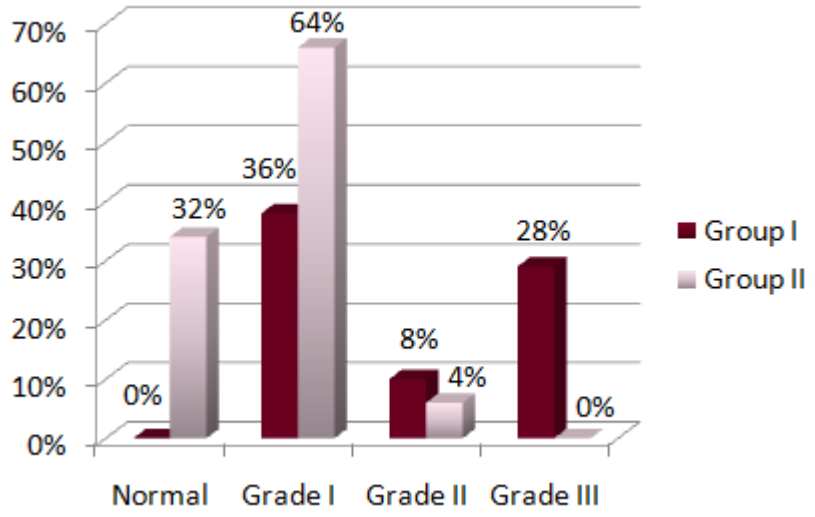

Figure 18: *LV diastolic function.*

Coronary angiography:

Coronary angiography was done only in 9 patients of group II (patients without AF).

Medications at admission *(table 17, figure 19)*:

Patients with AF were more likely to be on drugs that slowed atrio-ventricular conduction as beta blockers, (10 patients "40%" vs. 6 patients "24%", respectively) &less likely to be on aspirin (6 patients "24%" vs. 11 patients "44%" respectively). The use of ACE inhibitors, calcium channel blockers, and digoxin was similar in patients with &without AF (5 patients "20%" vs. 4 patients "16 %", 5 patients "20%" vs. 2 patients "8%"& 3 patients "12%" vs. "0%" respectively) as well as warfarin & statin (3 patients "12 %" vs. "0%", 1 patient "4%" vs. 3 patients "12%") None of the patients was on clopidogril therapy ***(table 17, figure 19)***.

Table (17): *Medications at admission*

Group / Parameter	**Group I** (with AF)		**Group II** (without AF)		***P* value**
	No.	**%**	**No.**	**%**	
β-blockers	10	40%	6	24%	<0.05
CCB	5	20%	2	8%	>0.05
Digoxin	3	12%	0	0%	>0.05
ACEI	5	20%	4	16%	>0.05
Statin	1	4%	3	12%	>0.05
Warfarin	3	12%	0	0%	>0.05
Aspirin	6	24%	11	44%	<0.05
Clopidogril	0	0%	0	0%	-------

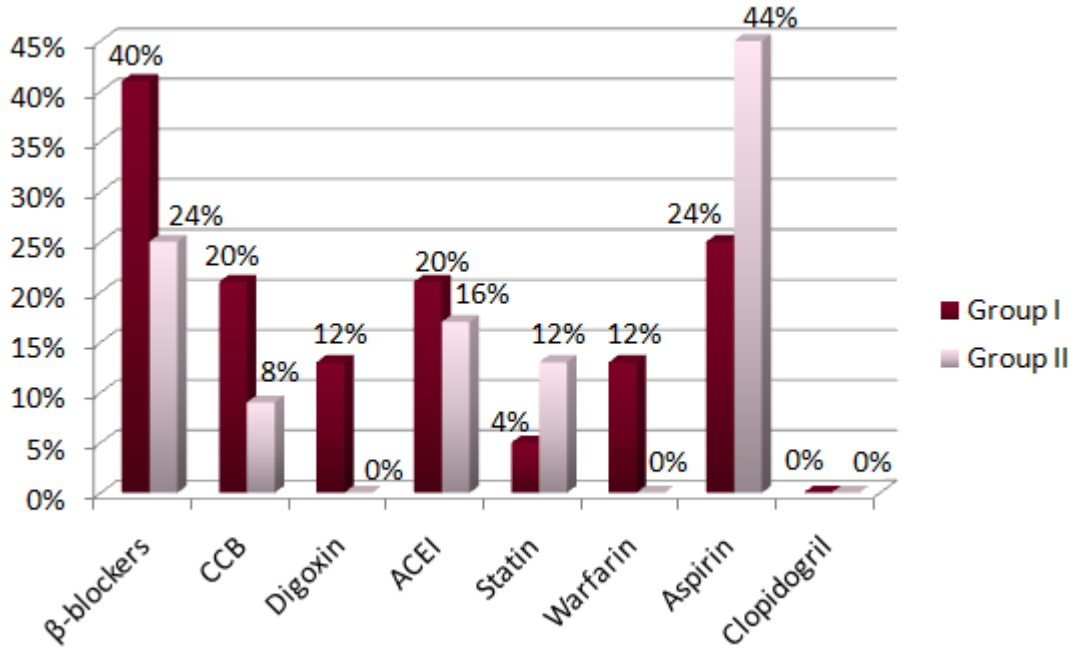

Figure (19): *Medications at admission*

Medications during hospital stay:

Patients with AF were more likely to receive warfarin (19 patients "76%" vs. "0%", P value <0.001). The use of clopidogril was less frequent in patients with AF than in those without AF (6 patients "24%" vs. 25 patients "100%", P value <0.001). All patients of both groups were receiving aspirin & statin.

No differences were found between patients with AF & those without AF in the use of beta blockers (20 patients "80%" vs. 18 patients "72 %") and Ca channel blockers (6 patients "24%" vs. 8 patients "32 %").

Patients with AF were more likely to receive anti-arrhythmic drugs as digoxin (6 patients "24%" vs. 0%) & amiodarone (5 patients "20%" vs. 0%) as well as ACE inhibitors (13 patients "52%" vs. 7 patients "28 %") ***(table 18, figure 20)***.

Table (18): *Medications during hospital stay*

Group / Parameter	**Group I** (with AF)		**Group II** (without AF)		***P* value**
	No.	**%**	**No.**	**%**	
β-blockers	20	80%	18	72%	>0.05
CCB	6	24%	8	32%	>0.05
Digoxin	6	24%	0	0%	<0.05
ACEI	13	52%	7	28%	<0.05
Statin	25	100%	25	100%	---
Warfarin	19	76%	0	0%	<0.001
Aspirin	25	100%	25	100%	---
Clopidogril	6	24%	25	100%	<0.001
Amiodarone	5	20%	0	0%	<0.05

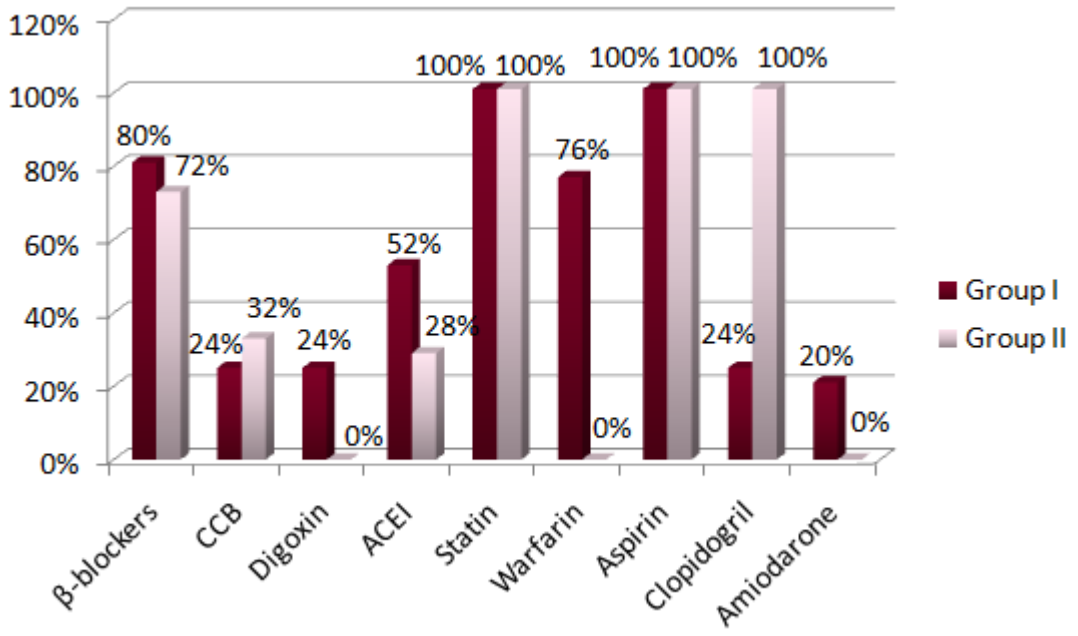

Figure (20): *Medications during hospital stay*

Course & duration of atrial fibrillation:

Patients with AF were more likely to be cardioverted medically (12 patients "48%"), 2 patients "8%" were cardioverted by DC;1 of them was due to hemodynamic instability & the other was due to failure of medical cadioversion, 5 patients "20%" reverted to sinus rhythm spontaneously, while 6 patients "24%" had persistent AF ***(table 19, figure 21)***.

Table 19: *Course &duration of atrial fibrillation.*

Duration / Course	Less than 48 h.		More than 48 h.		*P* value
Medical cardioversion	12	48%	0	0%	<0.05
DC cardioversion	2	8%	0	0%	>0.05
Spontaneous cardioversion	2	8%	3	12%	>0.05
Persistent AF	0	0%	6	24%	>0.05

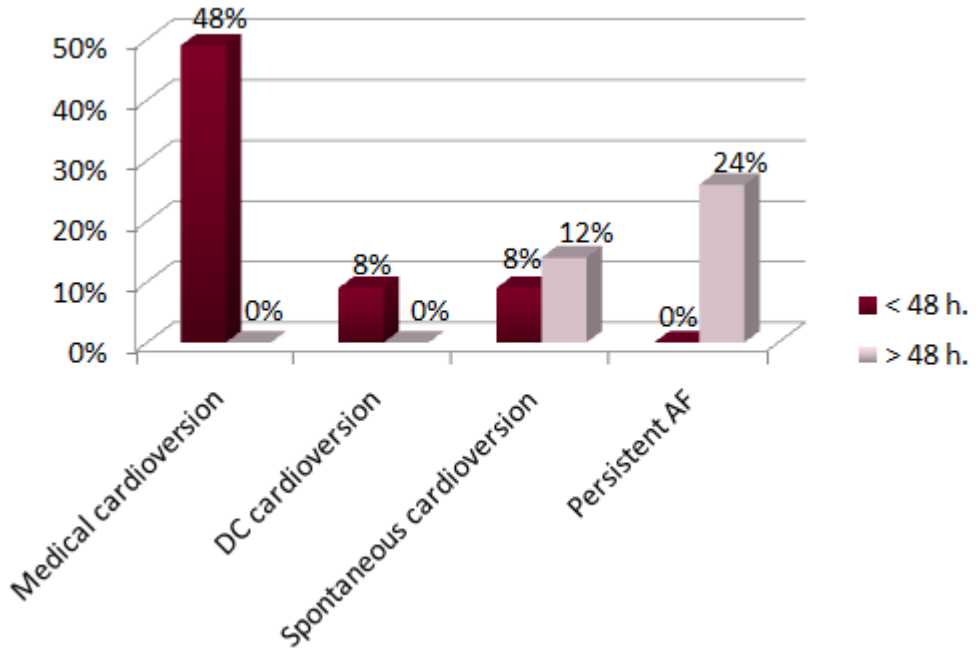

Figure 21: *Course &duration of atrial fibrillation.*

Short term outcome (in-hospital &3 months follow up):

ACS with AF was associated with worse short term outcomes. Of patients with AF, 24 patients had a complicated course versus 15 patients of those with sinus rhythm. 1patient of those with AF died during hospital admission but there was no mortality in patients without AF. New-onset congestive heart failure & pulmonary edema were higher in patients with ACS and AF than in those without AF (18 patients "72%" vs. 4 patients "16%", 5 patients "20%"vs. 1 patient "4%", respectively).

There was no differences between those with & without AF in the development of recurrent ischemic chest pain (19 patients "76%" vs. 15 patients "60 %") & stroke (1 patient "4.2%" vs. "0 %"). None of the patients developed bleeding or re-infarction ***(table 20, figure 22)***.

Table (20): *Short term outcome.*

Group / complication	Group I (with AF)		Group II (without AF)		χ^2	*P* value
	No.	%	No.	%		
Heart failure	18	72%	4	16%	11.1	<0.001
Pulmonary edema	5	20%	1	4%	1.7	>0.05
Recurrent chest pain	19	76%	15	60%	0.3	>0.05
Re-infarction	0	0%	0	0%	---	---
Stroke	1	4%	0	0%	1.02	>0.05
Bleeding	0	0%	0	0%	---	---
Death	1	4%	0	0%	1.02	>0.05

The number of the complicated cases couldn't be calculated from this table as the patient may have 2 or more complications.

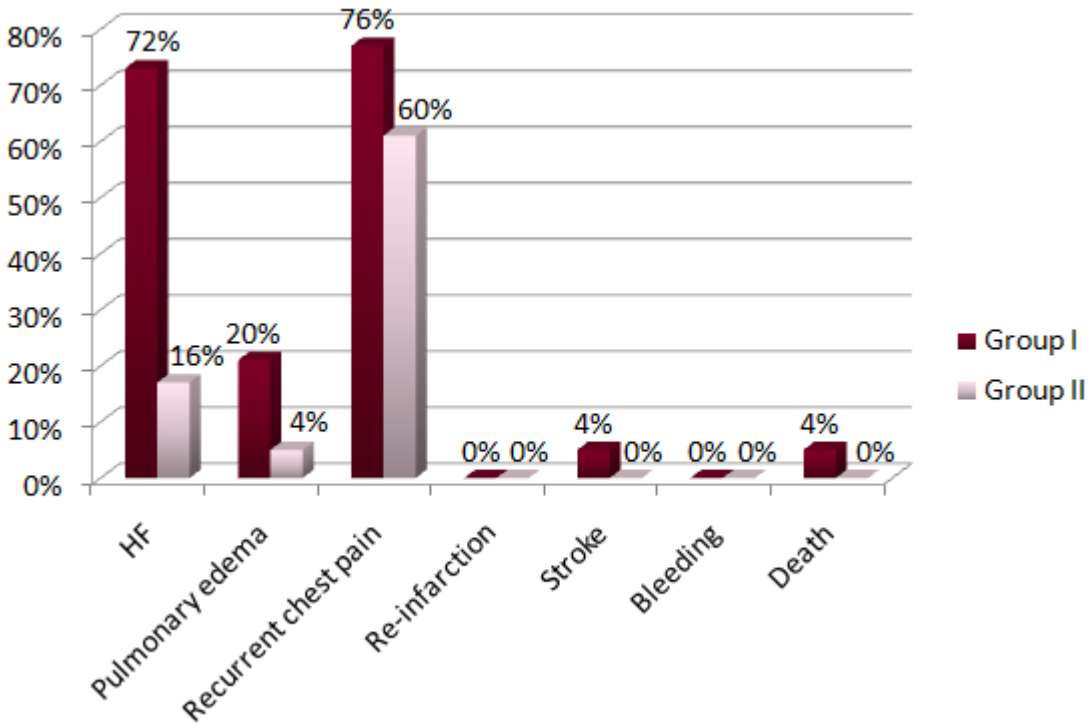

Figure 22: *Short term outcome.*

There was no significant statistical relation between duration of atrial fibrillation & in-hospital complications ***(table 21, figure 23)***.

Table 21: *Relation between the duration of AF & complications.*

Duration / Course	Less than 48 h.		More than 48 h.		*P* value
Complicated	12	75%	7	78%	>0.05
Non complicated	4	25%	2	22%	>0.05

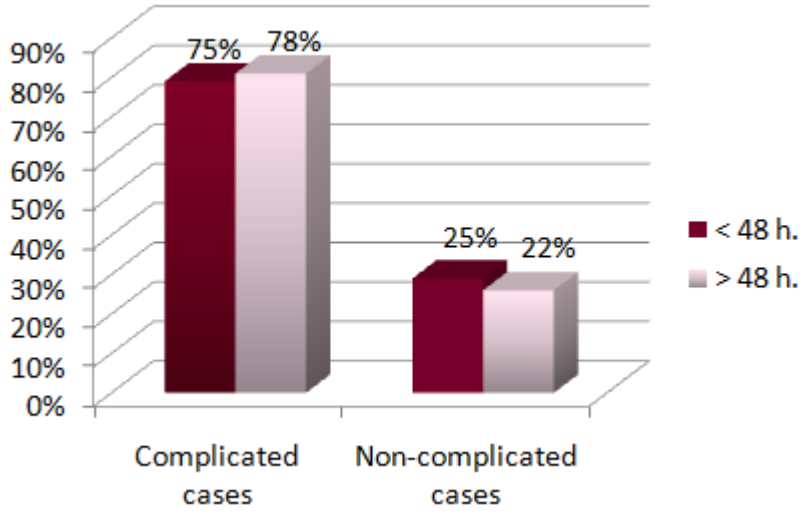

Figure 23: *Relation between the duration of AF & complications.*

Although multivariate regression analysis showed that AF wasn't significant in predicting in-hospital complications, univariate regression analysis identified AF, LVESD, LVEDD and LAD to be significant predictors of worse in-hospital outcome ***(table 22, 23, 24 &25)***.

Table 22: *Multivariate regression analysis*

parameter	Beta	t	Sig.
Age	-0.090	-0.562	0.577
Sex	0.053	0.339	0.737
DM	0.154	1.004	0.321
AF	0.276	1.419	0.164
WMSI	-0.192	-1.276	0.209
EF	-0.214	-1.110	0.274
Type of ACS (UA vs. NSTEMI)	-0.120	-0.567	0.573

Table 23: *Univariate regression analysis of patient's demographic data*

Complication / Parameter		Non Complicated		Complicated		t	*P* value
		no	%	no	%		
Age (mean±SD)		60.4±8.2		62.3±8.9		0.7	>0.05
Sex	**female**	8	42.1%	16	51.6%	0.1	>0.05
	male	11	57.9%	15	48.4%		
DM		9	47.4%	22	71.0%	2.8	>0.05
HTN		9	47.4%	23	74.2%	3.6	>0.05
Smoking		8	42.1%	9	29.0%	0.9	>0.05
Dyslipidemia		7	36.8%	14	45.2%	0.3	>0.05
AF		6	31.6%	19	61.3%	4.2	<0.05
Type of ACS	**NSTEMI**	6	31.6%	18	58.1%	2.3	>0.05
	UA	13	68.4%	13	41.9%		

***Table 24**: Univariate regression analysis of patient's clinical data*

Parameter	**Complicated**	**Non Complicated**	**t**	***P* value**
Pulse(Mean ± SD)	104.4194 ± 34.9	89.1 ± 31.3	1.6	>0.05
Diastolic BP (Mean ± SD)	86.8 ± 15.9	84.2 ± 9.6	0.7	>0.05
Systolic BP (Mean ± SD)	138.4 ± 26.9	129.5 ± 18.4	1.3	>0.05

***Table 25**: Univariate regression analysis of Echo parameters*

Parameter	**Complicated**	**Non Complicated**	**t**	***P* value**
LAD (Mean ± SD)	4.14 ± 0.6	3.7 ± 0.6	2.4	<0.05
WMSI (Mean ± SD)	1.31 ± 0.28	1.2 ± 0.29	1.3	>0.05
EF% (Mean ± SD)	47.6 ± 15.9	55.05 ± 12.02	1.8	>0.05
LVEDD(Mean ± SD)	5.4567 ± 0.72	4.9 ± 0.54	2.4	<0.05
LVESD(Mean ± SD)	4.0567 ± 0.91	3.5684 ± 0.62	2.2	<0.05