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THE PREVALENCE OF ATRIAL FIBRILLATION IN EMERGENCY DEPARTMENT

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ABSTRACT

Background: The atrial fibrillation is a common cardiac disease presented to emergency all over the world. Studying prevalence management and risk factors is important in treatment planning for atrial fibrillation. **Aim of study:** To investigate the prevalence, management and risks of atrial fibrillation in emergency department. **Patients and methods:** A prospective cross-sectional study carried out in the Emergency department of Baghdad Teaching Hospital/Medical City Complex in Baghdad city-Iraq during duration of one year from 1st of January, till 31st of December, 2023 on sample of 195 patients presented with atrial fibrillation. The atrial fibrillation was diagnosed from interpretation of a 12-lead electrocardiography showing irregularly ventricular rhythm with no discrete P wave, but law amplitude, continuously varying fibrillatory waves. **Results:** From 49,134 patients presented to emergency department, 195 (0.39%) patients had atrial fibrillation. The common treatment of atrial fibrillation patients was metoprolol and 24 (12.3%) patients were died. Factors related to death were older age, female sex, altered mental status, long chief complaint duration, heart failure history, stroke history, lasix use, high CHA2DS2 VASc score, negative electrolyte disturbances, high WBC count, low platelets count, anemia, high serum creatinine level, high serum potassium level and nor-adrenaline infusion treatment. **Conclusions:** The prevalence of atrial fibrillation in emergency department of Baghdad Teaching hospital is low.

KEYWORDS: Atrial fibrillation, Prevalence, management, Risk factors.

INTRODUCTION

Atrial fibrillation (AF) is the most common cardiac arrhythmia, and its prevalence is increased by the aging population and aging-related comorbidities.[1] AF is associated with an increased risk of mortality and morbidity due to heart failure, dementia, and ischemic stroke compared to patients without AF.[2] Comorbid conditions complicated by AF caused hospitalization, and consequently, the healthcare burden associated with AF is growing.[3] Previous studies, mainly from the United States or Europe, have reported an increase in hospitalizations and total cost for AF care in recent decades.[4] In Korea, hospitalizations for AF have increased by 4.2-fold, and the total cost of care increased by about 5.7-fold over the past 10 years.[3]

While the healthcare burden of AF is mainly related to hospitalization[5], an emergency department (ED) visit is an indicator that reflects poorly controlled AF symptoms or complications of AF and is associated with worsened quality of life. A substantial number of patients who visit an ED are subsequently hospitalized.[6] Despite the clinical impact of ED visits in patients with AF, most epidemiologic studies have been based on Western populations, with limited data in Asian populations.[6][7]

AIM OF STUDY

To investigate the prevalence, management and risks of atrial fibrillation in emergency department.

PATIENTS AND METHOD

Study design & settings

A prospective cross-sectional study carried out in the Emergency department of Baghdad Teaching Hospital/Medical City Complex in Baghdad city-Iraq during duration of one year from 1st of January, till 31st of December, 2023.

Study population
All patients with atrial fibrillation presented to Emergency department of Baghdad Teaching Hospital were the study population.

Inclusion criteria
Adult and adolescent patients (age ≥14 years).
Cardiac or respiratory symptoms.
Atrial fibrillation.

Exclusion criteria
Children and adolescents.
Pregnant females.
Lack reliable history
Not completing the required investigations.
Patient lost follow up.
Patient refused to participate.

Sampling
A convenient sample of 195 patients presented with atrial fibrillation was selected from Emergency department of Baghdad Teaching Hospital after eligibility to inclusion and exclusion criteria.

Data Collection
The data were collected directly from patients filled in a prepared questionnaire in Emergency department. The questionnaire was designed by the supervisor. The following information was checked for every patient:
Sociodemographic characteristics of AF patients: Age, sex, smoking and alcohol consumption.
Chief complaint of AF patients: Chief complaint and duration pof chief complaint.
Past medical history of AF patients at arrival: Hypertension, diabetes mellitus, heart failure, ischemic heart disease, vulvular heart disease, transient ischemic attack/stroke and renal disease.
Drugs history of AF patients: Drugs history and drugs types.
Assessment and ECG findings of AF patients: CHA2DS2 VASc score, ECG rate, signs of ischemia, signs of electrolyte disturbances and troponin test.
Chest x-ray findings of AF patients: Infection, pulmonary edema and cardiomegaly.
Investigations findings of AF patients: WBC count, platelets count, hemoglobin level, general urine examination, random blood sugar, blood urea level, serum creatinin level and serum potassium level.
Treatment of AF patients.
Fate of AF patients.

Each patient included in this study was examined by the researcher after taking full history. AF was diagnosed from interpretation of a12-lead ECG showing irregularly ventricular rhythm with no discrete P wave, but law amplitude, continuously varying fibrillatory waves. Previous ECG records were also reviewed when available. The investigations were done at the local emergency department laboratory. Follow up of patients was done by the researcher for duration of their stay in emergency department to assess the fate of patients.

Ethical considerations
Approval was taken from Arab Board of Health Specializations.
An agreement was taken from hospital authorities.
An oral informed consent was taken from patients enrolled in the study.

Statistical analysis
All patients' data entered using computerized statistical software; Statistical Package for Social Sciences (SPSS) version 22 was used. Descriptive statistics presented as (mean ± standard deviation) and frequencies as percentages. Multiple contingency tables conducted and appropriate statistical tests performed, Chi square test was used for categorical variables (Fishers exact test was used when expected variable was less than 20% of total variable). Independent sample t-test was used to compare between two means. In all statistical analysis, level of significance (p value) set at ≤ 0.05 and the result presented as tables and/or graphs.

RESULTS
From 49,134 patients presented to emergency department, 195 (0.39%) patients had atrial fibrillation (AF).

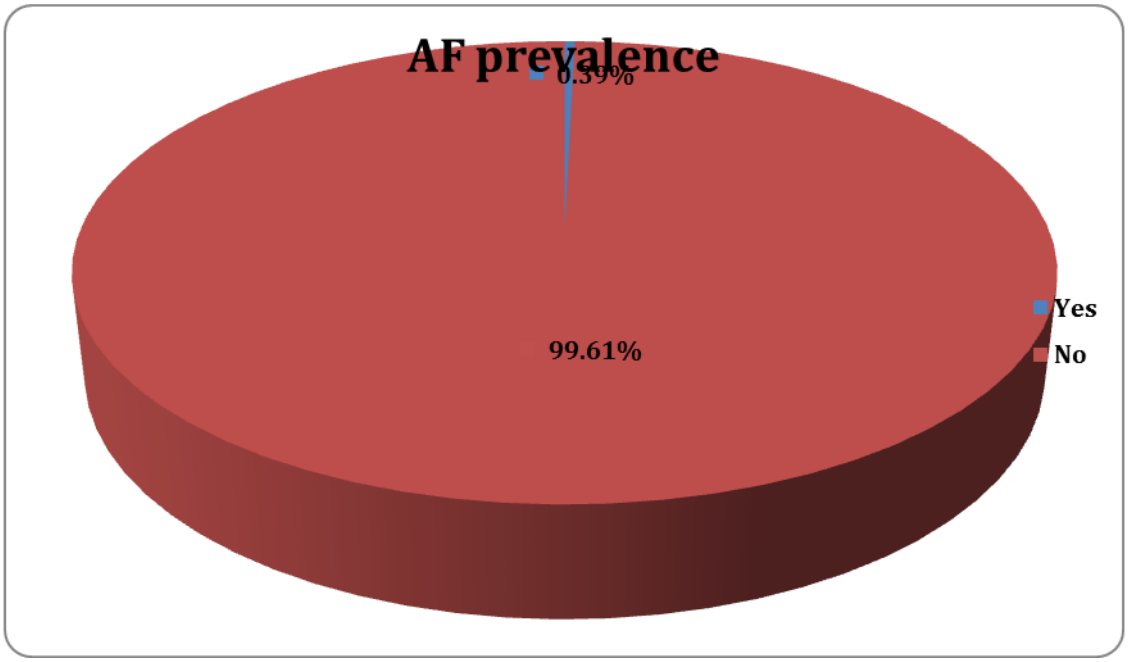

Figure 1: AF prevalence in emergency department.

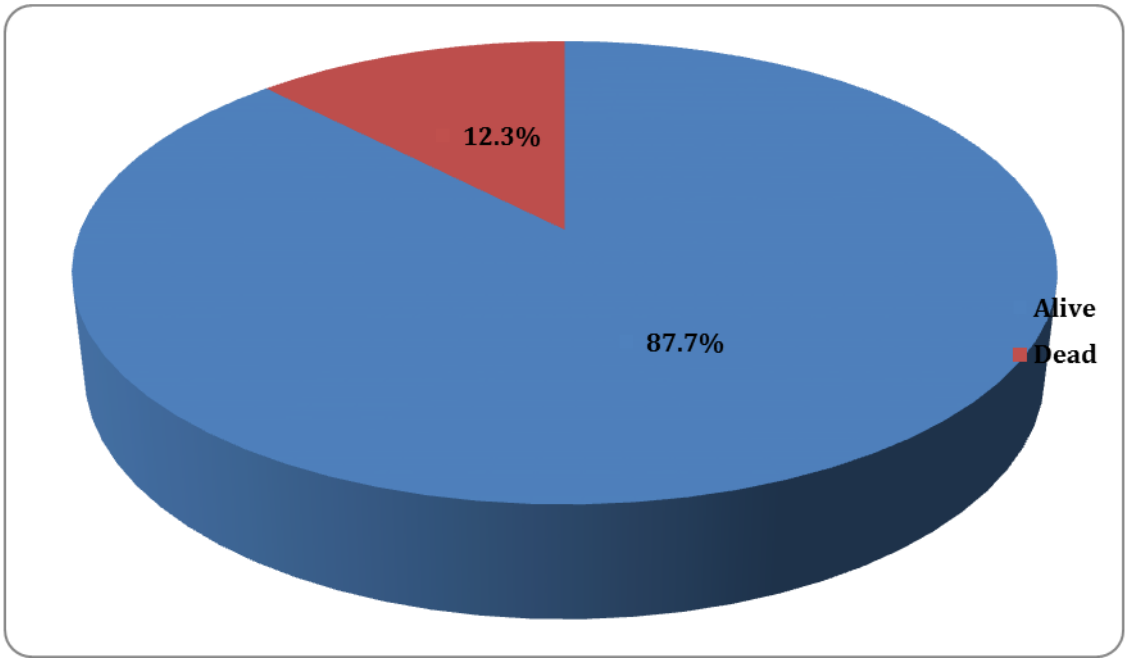

Figure 2: Disposition AF patients.

Common death causes of AF patients were septic shock in 8 (33.3%) patients and cardiogenic shock in 8 (33.3%) patients. (***Figure 3***)

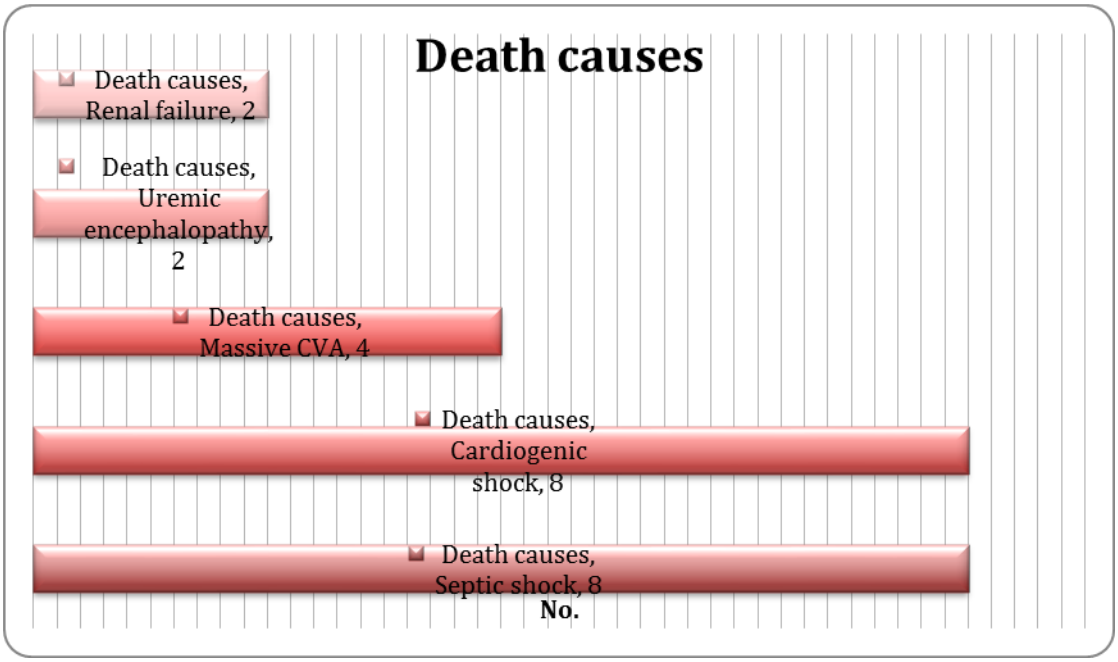

Figure 3: Death causes of AF patients.

There was a significant association between increased age of AF patients and death disposition (p=0.01). A significant association was observed between female sex and death of AF patients (p=0.05). No significant differences were observed between alive or dead AF patients regarding smoking history (p=0.18) and alcohol consumption (p=0.3). (***Table 1***)

Table 1: Distribution of sociodemographic characteristics according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
Age					
<50 years	11	6.4	0	-	**0.01***^{S}
50-59 years	37	21.6	0	-	
60-69 years	34	19.9	10	41.7	
≥70 years	89	52.0	14	58.3	
Sex					
Male	85	49.7	7	29.2	**0.05****^{S}
Female	86	50.3	17	70.8	
Smoking history					
Yes	59	34.5	5	20.8	0.18**^{NS}
No	112	65.5	19	79.2	
Alcohol consumption					
Yes	7	4.1	0	-	0.3*^{NS}
No	164	95.9	24	100.0	

** Fishers exact test, **Chi square test, NS=Not significant, S=Significant.*

There was a highly significant association between altered mental status of AF patients and death disposition (p<0.001). A significant association was observed between 1-3 days chief complaint duration and death of AF patients (p=0.02). (***Table 2***)

Table 2: Distribution of chief complaint according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
Chief complaint					
SOB	63	36.8	6	25.0	**<0.001***S
Altered mental status	29	17.0	9	37.5	
Chest pain	20	11.7	0	-	
Palpitation	17	9.9	0	-	
Left hemiparesis	9	5.3	0	-	
Cough	7	4.1	0	-	
Hematemesis	5	2.9	2	8.3	
Diabetic foot	6	3.5	0	-	
Fever	4	2.3	2	8.3	
Syncope	4	2.3	2	8.3	
Epigastric pain	5	2.9	0	-	
Vomiting	0	-	3	12.5	
Right hemiparesis	2	1.2	0	-	
Duration of chief complaint					
<1 day	14	8.2	0	-	**0.02***S
1-3 days	129	75.4	24	100.0	
>3 days	28	16.4	0	-	

** Fishers exact test, S=Significant.*

There was a significant association between heart failure history of AF patients and death disposition (p=0.05). A significant association was observed between TIA/stroke history and death of AF patients (p=0.01). No significant differences were observed between alive or dead AF patients regarding hypertension (p=0.2), diabetes mellitus (p=0.8), ischemic heart disease (p=0.3) and renal diseases history (p=0.06). (***Table 3***)

Table 3: Distribution of clinical history according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
Hypertension					
Yes	122	71.3	20	83.3	0.2*NS
No	49	28.7	4	16.7	
Diabetes mellitus					
Yes	74	43.3	11	45.8	0.8*NS
No	97	56.7	13	54.2	
Heart failure					
Yes	65	38.0	14	58.3	**0.05***S
No	106	62.0	10	41.7	
Ischemic heart disease					
Yes	56	32.7	10	41.7	0.3*NS
No	115	67.3	14	58.3	
History of TIA/stroke					
Yes	33	19.3	10	41.7	**0.01***S
No	138	80.7	14	58.3	
History of renal diseases					
Yes	30	17.5	8	33.3	0.06*NS
No	141	82.5	16	66.7	

** Chi square test, ** Fishers exact test, S=Significant, NS=Not significant.*

No significant differences were observed however, there was a significant association between lasix use by AF patients and death disposition (p=0.02). (***Table 4***)

Table 4: Distribution of drugs history according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
Drugs history					
Positive	124	72.5	13	54.2	0.06*^{NS}
Negative	47	27.5	11	45.8	
Drugs types					
No	47	27.5	11	45.8	**0.02****^{S}
Keppra & warfarin	8	4.7	0	-	
Isosorbide dinitrate, valsartan, metoprolol, clopidogrel & atrovastatin	23	13.5	0	-	
Bisoprolol, aspixaban, carbimazole & furosemide	6	3.5	0	-	
Furosemide & OHA	7	4.1	0	-	
OHA & digoxin	4	2.3	0	-	
Amlodipine & aldactone	4	2.3	0	-	
Lisionoprol, concur, warfarin & atrovastatin	2	1.2	0	-	
Aspirin	15	8.8	0	-	
Furosemide	15	8.8	7	29.2	
Methyl dopa, alfacalcidol, isordil, allopurinol & furosemide	13	7.6	0	-	
Insulin	12	7.0	3	12.5	
Aspirin, digoxin, insulin & atrovastatin	4	2.3	0	-	
OHA, amlodipine, rosuvastatin & clopidogrel	8	4.7	3	12.5	
Hemodialysis	3	1.8	0	-	

** Chi square test, S=Significant, NS=Not significant*.

Mean CHA2DS2 VASc score was significantly higher among AF patients with death disposition (p=0.02). A significant association was observed between negative electrolyte disturbances and death of AF patients (p=0.003). No significant differences were observed between alive or dead AF patients regarding ECG rate (p=0.6), ischemia signs (p=0.6) and troponin test (p=0.1). (***Table 5 and Figure 3***)

Table 5: Distribution of assessment and ECG findings according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
CHA2DS2 VASc score					**0.02***^{S}
Mean±SD	3.7±1.9		4.6±1.1		
ECG rate					0.6*^{NS}
Mean±SD	123±32		120±42		
Signs of ischemia					0.6**^{NS}
Yes	62	36.3	10	41.7	
No	109	63.7	14	58.3	
Signs of electrolyte disturbances					**0.003*****^{S}
Yes	8	4.7	5	20.8	
No	163	95.3	19	79.2	
Troponin test					0.1***^{NS}
Positive	12	7.0	4	16.7	
Negative	159	93.0	20	83.3	

** Independent sample t-test, ** Chi square test, ***Fishers exact test, S=Significant, NS=Not significant*.

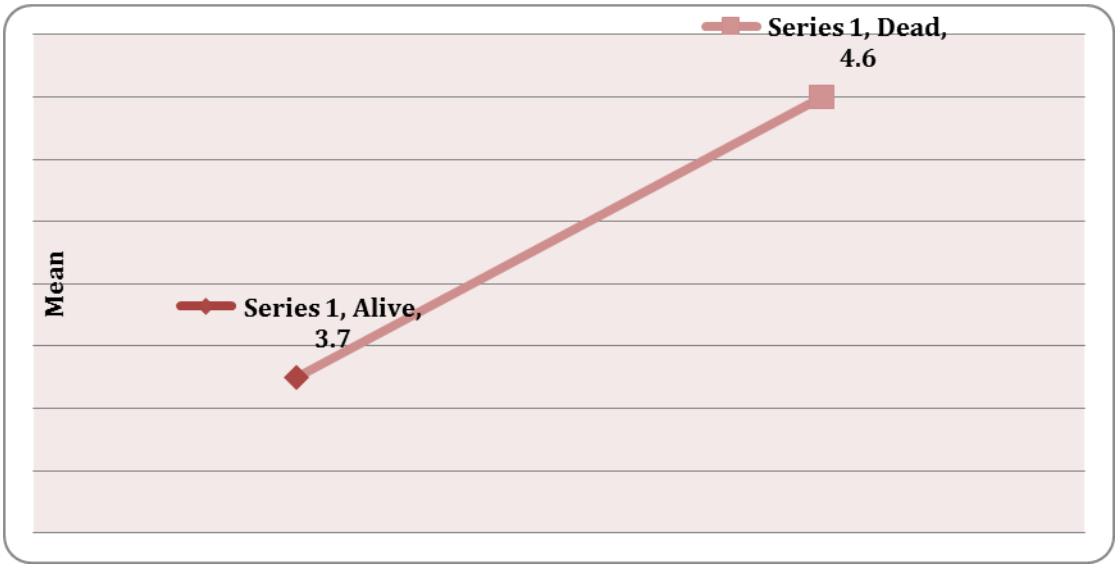

Figure 3: CHA2DS2 VASc score in regard to disposition.

No significant differences were observed between alive or dead AF patients regarding infection (p=0.6), pulmonary edema (p=0.3) and cardiomegaly (p=0.9). (***Table 6***)

Table 6: Distribution of x-ray findings according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
Infection					
Yes	62	36.3	10	41.7	0.6*^{NS}
No	109	63.7	14	58.3	
Pulmonary edema					
Yes	74	43.3	13	54.2	0.3*^{NS}
No	97	56.7	11	45.8	
Cardiomegaly					
Yes	85	49.7	12	50.0	0.9*^{NS}
No	86	50.3	12	50.0	

** Chi square test, NS=Not significant*.

There was a highly significant association between high WBC count of AF patients and death disposition (p<0.001). A highly significant association was observed between low platelets count and death of AF patients (p=0.01). There was a significant association between anemia of AF patients and death disposition (p=0.03). A highly significant association was observed between high serum creatinine level and death of AF patients (p<0.001). There was a highly significant association between high serum potassium level of AF patients and death disposition (p<0.001). No significant differences were observed between alive or dead AF patients regarding general urine examination (p=0.06), random blood sugar (p=0.08) and blood urea level (p=0.4). (***Table 7 and Figure 3***)

Table 7: Distribution of investigations findings according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
WBC count					
Low	4	2.3	0	-	**<0.001***^{S}
Normal	106	62.0	4	16.7	
High	61	35.7	20	83.3	
Platelets count					
Normal	154	90.1	13	54.2	**<0.001***^{S}
Low	17	9.9	11	45.8	
Hemoglobin level					**0.03***^{S}

Normal	89	52.0	7	29.2	
Anemia	82	48.0	17	70.8	
General urine examination					0.06**^{NS}
Normal	130	76.0	14	58.3	
Abnormal	41	24.0	10	41.7	
Random blood sugar level					0.08**^{NS}
Normal	121	70.8	21	87.5	
High	50	29.2	3	12.5	
Blood urea level					0.4*^{NS}
Normal	4	2.3	0	-	
High	167	97.7	24	100.0	
Serum creatinine level					**<0.001****^{S}
Normal	109	63.7	2	8.3	
High	62	36.3	22	91.7	
Serum Potassium level					**<0.001***^{S}
Normal	162	94.7	16	66.7	
High	9	5.3	8	33.3	

** Fishers exact test, **Chi square test, S=Significant, NS=Not significant.*

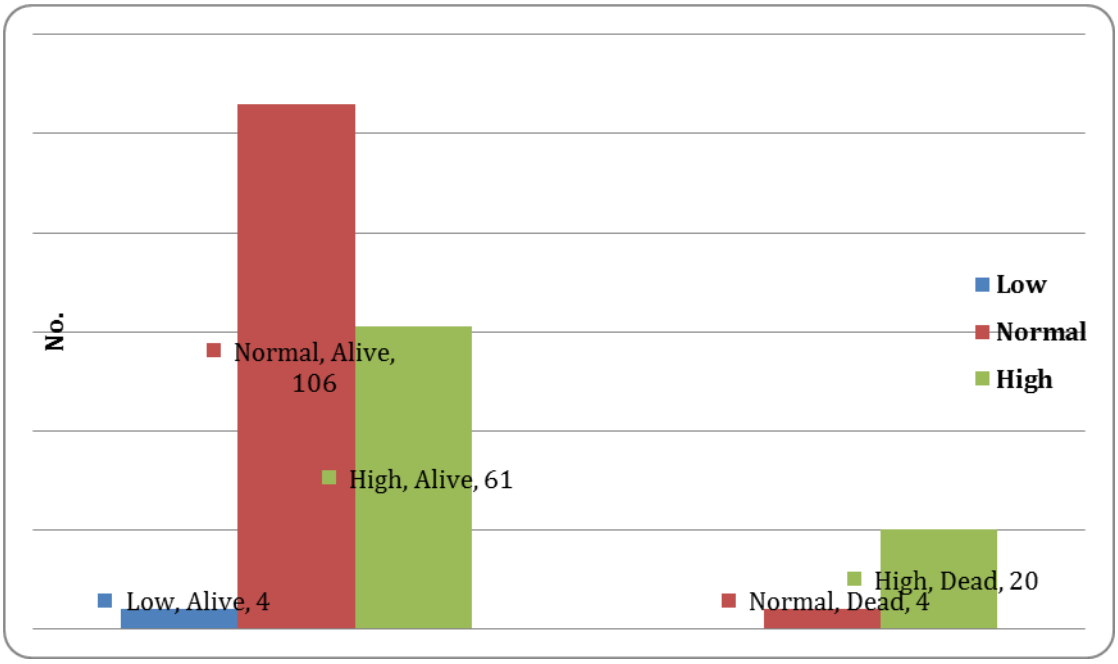

Figure 4: Distribution of WBC count in regard to fate.

There was a highly significant association between nor-adrenaline infusion treatment of AF patients and death disposition (p<0.001). (***Table 8***)

Table 8: Distribution of treatment according to fate.

Variable	Disposition				P
	Alive		Dead		
	No.	%	No.	%	
Treatment in ED					**<0.001***^{S}
Fluids & AB	14	8.2	5	20.8	
Digoxin vial	22	12.9	0	-	
Electrical cardioversion	10	5.8	4	16.7	
Electrical cardioversion & Amiodarone infusion	12	7.0	2	8.3	
AB, anti-ischemic & surgical intervention	2	1.2	0	-	
AB, angesid & lasix	12	7.0	0	-	
Concur	11	6.4	0	-	
Metoprolol	62	36.3	5	20.8	

Metoprolol & amiodarone	4	2.3	0	-	
Anti-ischemic	3	1.8	0	-	
Electrical cardioversion & nor-adrenaline infusion	2	1.2	3	12.5	
Blood transfusion, OGD & carvedilol	2	1.2	0	-	
Nebivolol	3	1.8	0	-	
Amiodarone vial	3	1.8	0	-	
Nor-adrenaline infusion	0	-	5	20.8	
Angesid	6	3.5	0	-	
AB & hemodialysis	3	1.8	0	-	

** Fishers exact test, S=Significant*

DISCUSSION

The atrial fibrillation represented a common emergency cardiovascular disease. Studying the earlier management and risk factors related to atrial fibrillation is important in saving lives and reducing the cost.[8]

In present study, the prevalence of atrial fibrillation (0.39%) among patients presented to emergency department in Baghdad Teaching hospital was (0.39%). This prevalence is relatively close to AF prevalence of (0.66%) reported by Shah et al[9] cross sectional study in Nepal on patients admitted to internal medicine emergency department. However, our study prevalence is lower than results of Salam et al[10] scoping review study which revealed that prevalence of atrial fibrillation among patients presented to emergency department of Arabic Middle East countries was ranged between 2.8% to 5.8%. Novotny et al[11] retrospective study found that 1.8% of patients presented to emergency department had a cardiac arrhythmia. This low prevalence of atrial fibrillation in our study might be attributed to increased number of Specialist Cardiac centers in Baghdad city that decreased number of AF cases presented to Baghdad Teaching hospital in addition to differences in factors related to study design and sample size differences between different studies.

In current study, more than half of AF patients were admitted to medical ward, while 24 (12.3%) patients were died. This mortality rate of AF is close to AF mortality rate of (14.1%) reported by Niederdöckl et al[12] single center cohort study in Austria. However, our study mortality rate of AF is higher than results of Jackson et al[7] cross sectional study in United States of America which found that mortality rate of AF in emergency department was (0.01%). Common death causes of AF patients in our study were septic shock in 8 (33.3%) patients and cardiogenic shock in 8 (33.3%) patients. These findings are in agreement with reports of Velliou et al[13] review study in Greece which documented that common causes of death for AF patients in emergency department were septic shock and cardiogenic shock. In our study, the common treatment of AF patients was metoprolol in 67 (34.4%) patients, followed by; digoxin vial in 22 (11.3%) patients, antibiotics & fluids in 19 (9.7%) patients, electrical cardioversion in 14 (7.2%) patients, electrical cardioversion & Amiodarone in 14 (7.2%) patients, etc. These findings are close to results of Alsagaff et al[14] study in Indonesia which reported the metoprolol, digoxin vial and electrical cardioversion as the common treatment of AF patients in emergency department.

The present study found was a significant association between increased age of AF patients and death disposition (p=0.01). This finding coincides with results of Jasim et al[42] study in Iraq which reported that increasing age of patients is accompanied with higher incidence and death risk of atrial fibrillation. In our study, a significant association was observed between female gender and death of AF patients (p=0.05). This finding is parallel to results of Volgman et al[15] review study in United States of America which documented higher death risk of atrial fibrillation among women as compared to men.

The current study found a highly significant association between altered mental status of AF patients and death disposition (p<0.001). Similarly, Leo et al[16] review study in United Kingdom stated that altering mental status of AF patients is considered as poor prognosis factor. In our study, a significant association was observed between 1-3 days chief complaint duration and death of AF patients (p=0.02). This finding is consistent with results of Shao et al[17] prospective cohort study in China which found that longer complaint of AF especially with secondary AF was accompanied with higher mortality in emergency department.

Present study found a significant association between heart failure history of AF patients and death disposition (p=0.05). This finding is consistent with results of Oba et al[18] hospital-based retrospective observational study in Japan which revealed that preexisting heart failure is a common risk factor for death among patients with AF. In our study, a significant association was observed between TIA/stroke history and death of AF patients (p=0.01). This finding is similar to results of Fatah et al[19] cross sectional multicenter study in Iraq which reported that 17.6% of patients with TIA/stroke had AF and the death was reported in half of these cases. Our study found a significant association between lasix use by AF patients and death disposition (p=0.02). This finding is parallel to results of Rodríguez-Molinero et al[20] prospective cohort study in Spain.

Current study found that mean CHA2DS2 VASc score was significantly higher among AF patients with death

disposition (p=0.02). Consistently, Wu et al[21] hospital-based prospective study in China found that CHA2DS2 VASc score is a significant predictor of death among elderly patients with atrial fibrillation. In our study, a significant association was observed between abnormal electrolyte disturbances and death of AF patients (p=0.003). This finding is parallel to results of Rafaqat et al[22] review study in Pakistan. Our study showed that AF patients with death outcome were significantly had high WBC count, low platelets count, anemia, high serum creatinine level and high serum potassium level (p<0.05). These findings are consistent with results of different literatures such as Rienstra et al[23] study in United States of America and Tongyoo et al[24] prospective cohort study in Thailand.

In present study, there was a highly significant association between nor-adrenaline infusion treatment of AF patients and death disposition (p<0.001). This finding coincides with results of Na et al[25] retrospective review study in South Korea which reported that nor-adrenaline was not reducing risk of mortality or arrhythmia among patients with cardiogenic shock, but reduced the need for additional vasopressors.

CONCLUSIONS

The prevalence of atrial fibrillation in emergency department of Baghdad Teaching hospital is low.

The common treatment of patients with atrial fibrillation is the metoprolol.

The mortality rate of patients with atrial fibrillation in emergency department of Baghdad Teaching hospital is (12.3%).

Common death causes of patients with atrial fibrillation are septic shock and cardiogenic shock.

Risk factors for death in patients with atrial fibrillation are older age, female sex, altered mental status, long chief complaint duration, heart failure history, stroke history, lasix use, high CHA2DS2 VASc score, negative electrolyte disturbances, high WBC count, low platelets count, anemia, high serum creatinine level, high serum potassium level and nor-adrenaline infusion treatment.

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