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# Indices of Renal impairment in patients with Atrial Fibrillation

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Atrial Fibrillation, urinalysis, serum electrolytes, serum creatinine, chronic kidney disease

**ABSTRACT**

Atrial fibrillation is the commonest type of arrhythmias with significant mortality and morbidities. There is a correlation between AF and renal impairment and this correlation is complex and may be a manifestation of cardiorenal syndrome, a bidirectional complication of these diseases or its treatment or both coexist in same disease. To evaluate frequency of renal indices abnormality among patients with atrial fibrillation. By using cross sectional descriptive study, randomly selected 52 atrial fibrillation patients admitted to Coronary care unit in Al-Nasiriya city underwent a complete evaluation for renal indices including blood urea, serum creatinine, urinalysis, serum electrolytes, Albumin creatinine ratio and ultrasound for renal system. Also performed questionnaire were obtained from all patients. Patients labeled as chronic kidney disease or underwent to renal replacement therapy were excluded. Mean age of patient's 59.6±13.1 years and for Age at diagnosis 56.9±14.9. All patients have one or more abnormal renal indices. Most abnormalities appear in urinalysis (100% of patients) followed by abnormal Albumin creatinine ratio (48% of patients), Blood urea in 26.92%, Serum creatinine in 9.6% and ultrasound in 7.69%. 75% had chronic diseases plus AF. Significant correlation between male gender and highly abnormal blood urea (P.value=0.05), serum creatinine (P.value=0.014) and Albumin creatinine ratio (P.value=0.013). Also between direct cardioversion shock and blood urea (P.value=0.018), serum creatinine (P.value=0.006) and Albumin creatinine ratio (P.value=0.047). Blood urea correlated with abnormal echo finding (P.value=0.02) and number of medications that used for atrial fibrillation management (P.value=0.031). Some renal indices is abnormal in Atrial fibrillation patients especially urinalysis, blood urea, serum creatinine and Albumin creatinine ratio. In addition, this abnormality related to gender, using of direct cardioversion shock, echo abnormalities and number of medications for atrial fibrillation.



## 1. Introduction

Atrial fibrillation (AF) is the commonest type of arrhythmia that characterized by disorganized, fast, and uneven atrial activity associated with absence of atrial contractility and an irregular ventricular rate that is

depended on atrioventricular nodal transmission [1], [2].

The atrial fibrillation initiated and/or maintained by multiple complicated mechanisms but mainly by three theoretical mechanism involve Ectopic focus, Ion flux (electrical stimulus together with potassium depletion and acetylcholine or vagal stimuli) and re-entry mechanism [3].

Approximately 90% of atrial fibrillation episodes can be asymptomatic, but many patients presented with typical or atypical features of AF episodes involving dyspnea, palpitations, dizziness, fatigue, decompensated heart failure and angina. In addition, atrial fibrillation may be cause or progress to systemic thromboembolism, tachycardia-induced cardiomyopathy and hemodynamic dysfunction [5].

Generally, treatment of AF depended on duration of the presentation, if less than 48 hours use rhythm control regime that include pharmacological and electrical cardioversion according to BP, if the systolic BP above 90 use pharmacological cardioversion or use electrical cardioversion if systolic BP less than 90, On other hand, Catheter ablation or combination therapy is the second line and frequently successful6. After 48 hours, rate control is preferred but also rhythm control can be used after prescription oral anticoagulants for 3 weeks before cardioversion and 4 weeks afterwards or after exclude intra-cardiac thrombosis by Transesophageal echo [7]. Rhythm control and rate control have same prognosis [8]. For acute rate control, beta-blockers and non-dihydropyridine calcium channel blockers are favored over digoxin due to their rapidity of action onset and efficacy at high sympathetic activity [9]. Nonpharmacological rate control can be achieved by atrioventricular nodal ablation and pacing for selected patients with low long-term mortality and complications rate [10].

Renal impairments include both AKI and CKD according to duration [12]. The detection of renal impairments usually made by clinical evaluation and renal biomarkers that usually include BUN, serum creatinine, serum and urine electrolytes, general urine examination (grossly, dipsticks and microscopically), imaging by ultrasounds or other modalities, creatinine clearance, histological evaluation, immunological investigations and urine evaluations for albumin, proteins and electrolytes [13].

Acute kidney injury (AKI), previously known as acute renal failure is characterized by the sudden impairment of kidney function resulting in the retention of nitrogenous and other waste products normally cleared by the kidneys [14]. AKI may occur patients with AF as a rare result of thromboembolic complication in form of renal infarction, as a manifestation of cardiorenal syndrome in type 3 that occur due to hemodynamic factors like low cardiac output or/and non-hemodynamic factors like inflammatory and neurohormonal activities [15]. AF occur coexistence with AKI as a complications of a disease like certain bacterial infection and rarely in sarcoidosis [16], [17]. The use of warfarin in patients with AF increase the risk of AKI in contrast to non-vitamin K antagonist that decrease the risk [18].

CKD is defined as abnormalities of kidney structure or function, present for > 3 months, with implications for health. AF is the most common arrhythmia in patients with chronic kidney disease (CKD) and is associated with increased risk of stroke and thromboembolism [19]. A bidirectional relationship exists between atrial fibrillation (AF) and chronic renal disease. Patients with AF have a higher incidence of renal dysfunction, and the latter predisposes to incident AF [20]. AF is present in 15–20% of patients with CKD (10–20 times higher than the general population) [21]. Even modest abnormalities in kidney function linked with a higher risk of developing atrial fibrillation later in life [22]. CKD considered as an independent risk factor for AF and it is recommended to assessment of kidney function by serum creatinine or creatinine clearance for all AF patients to detect kidney disease particularly in those with bleeding episodes and to

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support correct dosing of AF therapy and all AF patients treated with oral anticoagulation should be considered for at least yearly renal function evaluation to detect chronic kidney disease6. In Type 4 cardiorenal syndrome the Primary CKD contributes to cardiac dysfunction, which may be manifested by arrhythmia especially AF [23].

To evaluate frequency of renal indices abnormality among patients with atrial fibrillation

**2. Patients and Methods**

A cross sectional study was conducted over the period of 5 months from 15 July 2017 until 30 November 2017.

The total numbers of patients in the study were 52 persons that were admitted to Coronary Care Unit (CCU) /Al-Hussain teaching hospital in Al-Nasiriya city. The patient are randomly selected after exclude known chronic kidney disease (renal impairment > 3 months) regardless type of treatment whether patients on renal replacement therapy or not and also exclude patients on Renal Replacement Therapy (RRT) in both AKI and CKD.

Data were collected from each patient by using a preformed questionnaire, which included age, gender, history of AF, age at diagnosis of AF, duration of AF, cause of AF if known, symptoms or complications at diagnosis, how diagnosed, detailed history for current Pharmacological and non- Pharmacological management including drugs duration, doses using of electrical cardioversion and its complications.

Also data include chronic disease other than AF (duration of disease, complications, treatment and its duration), medical care of patients generally and strict history about medical care in the last 3 months, drug history, history of smoking and alcohol.

All patients underwent echocardiography study by echologist (as a usual approach in our hospital AF management).

We sent all patients for assessment of renal indices:
Blood urea
Serum creatinine
Urinalysis
Urinary Albumin creatinine ratio (microalbumin)
Serum electrolytes (potassium, sodium, chloride, calcium)
Abdominal and pelvic ultrasound for urinary system by radiologist.
From all patients venous blood and urine samples were taken.
The venous blood samples (5 ml without tourniquet) were taken from every patient for estimation blood urea, serum creatinine and serum electrolytes.

The venous samples kept in coagulated gel tubes and immediately send to hospital laboratory where firstly serum obtained after centrifuge the samples at 4000 rpm for 10 minutes and by using automatic device (Architect Abbott c4000 analyzer device) and its reagents (closed system) that act principally by photometric, potentimetric and turbidimetric methods, the blood urea, serum creatinine and electrolytes were obtained usually within 1-2 hours (reference ranges; blood urea 15-40 mg/dl, serum creatinine 0.68-1.36 mg/dl, S.K 3.6-5 mmol/l, S.Na 135-145 mmol/l, S.Ca 8.5-10.5 mg/dl, S.Cl 95-107 mmol/l and ACR < 30 mg/g) [24], [25].

Urine samples (10-20 ml) were taken from every patients for estimation urinalysis and albumin creatinine ratio.

These samples were subdivided and kept into two urine tubes each one contain 5-10 ml, first one immediately send to hospital laboratory and after gross examination, the samples centrifuged for 5 minutes at 1500-2000 rpm and then the supernants and the sediments underwent to dipstick examinations (by using reagents from ACON laboratories, Inc. USA). and microscopic examinations (for urinary casts, crystals, cells, WBCs and RBCs) by laboratorian.

Dipsticks examination include detection of glucose, nitrate, bilirubin, urobilinogen and albumin.

The second urine sample kept in refrigerator and within 6 hours send to private clinical laboratory for detection albumin/creatinine ratio by using ichroma II (boditech med Inc. Korea) reader device that principally act by fluorescence immunoassay method (automated quantitative measurement of microalbumin) and the reagents that were used i-chroma microalbumin from same company.

After matching data (performed questionnaire, laboratories test and imaging) for all patients, the results obtained by using Statistical analysis performed by using Spss (statistical package for social sciences) version 20. In which we use number, percentage, mean and standard deviation as descriptive statistics. For analysis, we use Chi square, independent sample t-test, ANOVA (analysis of variance) and Pearson correlation coefficient as needed, P-value <0.05 regarded significant.

**3. Results**

**Table (1.1)** Descriptive statistics for patients under study (n=52)

| | | Minimum | Maximum | Mean±SD |
|---|---|---|---|---|
| Age/years | | 31.00 | 85.00 | 59.63 ± 13.12 |
| Age at diagnosis/years | | 19.00 | 85.00 | 56.92 ± 14.94 |
| Blood urea mg/dl | | 13.00 | 184.00 | 38.71 ± 27.63 |
| Creatinine mg/dl | | 0.38 | 2.53 | 0.89 ± 0.42 |
| ACR (mg/g) | | 0.20 | 300.00 | 69.44 ± 86.22 |
| S. K(mmol/L) | | 2.10 | 6.70 | 3.83 ± 0.58 |
| S.Ca (mg/dl) | | 7.30 | 10.00 | 8.85 ± 0.48 |
| S. Na (mmol/L) | | 129.00 | 146.00 | 137.71 ± 4.07 |
| S. Cl (mmol/L) | | 91.00 | 116.00 | 104.36 ± 4.40 |
| Gender | Male | 20(38.5%) | | |
| | Female | 32(61.5%) | | |
| Symptoms at diagnosis* | Palpitation | 51(98.1%) | | |
| | Chest pain | 1(1.9%) | | |
| Smoking** | Smoker | 13(25%) | | |
| | x-smoker | 4(7.7%) | | |
| | Non | 35(67.3%) | | |
| Complication due to AF | Stroke | 6(11.5%) | | |
| | No | 46(88.5%) | | |

* all patients diagnosed by ECG.

**smoking definitions according to NCHS (National Center for Health Statistics) [26]

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Table above show mean patients' age 59.63±13 years and mean age at diagnosis is 56.9 ± 14.9 years, mean Blood urea 38.7 ± 27.6 mg/dl, mean serum creatinine 0.89±0.4mg/dl, mean ACR 69.4±86, mean S.K 3.8±0.586, mean S.Ca 8.86±0.49 mg/dl. mean S.Na 137.7±4 mmol/L, mean S.Cl 104±4 mmol/L, male 38.5% while female 61.5%, palpitation was 98.1% of presenting symptoms, 25% smokers and 67.3% non-smokers while others x-smokers and 11.5% of patients with AF complicated with stroke.

**Table (1.2)** renal indices findings in studied sample.

| Renal indices[a] | | frequency of abnormal results | frequency of normal results | Percentage of abnormality |
|---|---|---|---|---|
| Blood urea[b c] | | 14 | 38 | 26.92% |
| Serum creatinine[b c] | | 5 | 47 | 9.6% |
| G.U.E[d] | | 52 | 0 | 100% |
| Serum electrolytes | S.K | 14 | 38 | 26.92% |
| | S.Na | 14 | 38 | 26.92% |
| | S.Ca | 9 | 43 | 17.3% |
| | S.Cl | 13 | 39 | 25% |
| ultrasound | | 4 | 48 | 7.69% |
| ACR | | 25 | 27 | 48% |

[a] normal reference ranges (blood urea 15-40 mg/dl, serum creatinine 0.68-1.36 mg/dl, S.K 3.6-5 mmol/l, S.Na 135-145 mmol/l, S.Ca 8.5-10.5 mg/dl, S.Cl 95-107 mmol/l 24 and ACR25 < 30 mg/g)

[b] abnormally high

[c] both elevated in 4 patients and mean of (urea-creatinine ratio) for all patients with abnormal urea, creatinine or both is (64.79267±32.02757)

[d] include grossly, dipstick and microscopic examinations.

Table above show Blood urea highly abnormal in 26.9% of patients while serum creatinine 9.6%, all patient had GUE abnormalities. Serum electrolytes (S.K, S.Na and S.Cl) abnormal in approximately quarter of patients while S.Ca abnormal in 17.3%, Ultrasound abnormal in 7.69% and ACR abnormal in 48%.

**Table (1.3)** GUE abnormalities in studied sample.

| Urinalysis elements | Finding | | frequency | Percentage |
|---|---|---|---|---|
| Gross appearance | color | Turbid | 4 | 7.69% |
| | | Cloudy | 4 | 7.69% |
| | | Brown | 2 | 3.846% |
| Dipstick examination | Albuminuria | | 8 | 15.38% |
| | Glucose in urine | | 1 | 1.9% |
| Microscopical examination | Urinary RBCs | | 6 | 11.5% |
| | Urinary WBCs | | 51 | 98% |
| | Urinary epithelial cells | | 44 | 84.6% |
| | Amorphous Urate crystal | | 40 | 76.9% |
| | Granular cast | | 10 | 19.2% |
| | Hyaline cast | | 1 | 1.9% |
| | Coarse cast | | 1 | 1.9% |
| | Monilla in urine | | 1 | 1.9% |

Table above show abnormal gross appearance in 19.18% (turbid and cloudy each one 7.69% and brown 3.8%), albuminuria presented in 15.4%, urinary RBCs presented in 11.5%, urinary WBCs in 98%, urinary epithelial cells in 84.6%, granular cast in 19%, Amorphous Urate in 76.9%, Hyaline and Coarse in 1.9% and Urinary monilla found in 1.9% of patients.

**Table (1.4)** comorbid diseases other than AF

| Chronic disease | Frequency* | percentage |
|---|---|---|
| Aortic stenosis | 1 | 1.9% |
| Asthma | 3 | 5.76% |
| DM | 16 | 30.75% |
| HF | 5 | 9.6% |
| HT | 20 | 38.46% |
| Hypothyroidism | 1 | 1.9% |
| IHD | 5 | 9.6% |
| mitral stenosis | 2 | 3.8% |
| CA breast | 1 | 1.9% |
| CA larynx | 1 | 1.9% |
| Stroke | 2 | 3.8% |
| RA | 1 | 1.9% |
| None | 13 | 25% |

*Some patients had more than one chronic disease so the total more than 52

This table show 75% of patients had chronic diseases other than AF while only 25% had none. HT in 38.46% of patients, 30.75% had DM, IHD and HF each one found in 9.6%, asthma in 5.76% stroke and MS each one found in 3.8% of patients and aortic stenosis, hypothyroidism, RA, CA breast and CA larynx each one of them found in 1.9%.

**Table (1.5)** Comparison between male and female in different renal indices.

| Variable | Male(n=20) | Female(n=32) | P value |
|---|---|---|---|
| | Mean ±SD | Mean ± SD | |
| Blood urea (mg/dl) | 47.85±36.17 | 33±19.16 | 0.05 |
| Creatinine(mg/dl) | 1.07±0.54 | 0.78±0.29 | 0.014 |
| Urinary WBC | 5.45±4.85 | 6.84±5.54 | 0.510 |
| ACR(mg/g) | 32.46±20.62 | 92.54±80.64 | 0.013 |
| K(mmol/L) | 3.94±0.80 | 3.76±0.39 | 0.278 |
| Ca(mg/dl) | 8.87±0.55 | 8.84±0.45 | 0.843 |
| Na(mmol/L) | 137.1±4.16 | 138.09±4.04 | 0.398 |
| Cl(mmol/L) | 104.45±3.15 | 104.31±5.08 | 0.914 |

Table above show significant correlations between AF on one hand and Blood urea (P.value=0.05), serum creatinine (P.value=0.014) and ACR (P.value=0.013) on other hand between male and female.

**Table (1.6)** comparison between those needing DC and not need.

| Renal indices | DC | No DC | P value |
|---|---|---|---|
| | Mean ± SD | Mean ± SD | |
| Blood urea (mg/dl) | 61.42±21.7 | 35.17±18.46 | 0.018 |

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| | | | |
|---|---|---|---|
| Creatinine (mg/dl) | 1.30±0.81 | 0.83±0.30 | 0.006 |
| Urinary WBC | 7.14±3.84 | 6.17±5.74 | 0.749 |
| ACR(mg/g) | 92.78±76.91 | 65.81±55.80 | 0.047 |
| K(mmol/L) | 3.63±0.84 | 3.86±0.54 | 0.343 |
| Ca(mg/dl) | 8.60±0.71 | 8.89±0.44 | 0.136 |
| Na(mmol/L) | 137.14±4.29 | 137.80±4.08 | 0.696 |
| Cl(mmol/L) | 105.28±7.80 | 104.22±3.74 | 0.558 |

Table above show significant correlations between use of DC shock in management of AF in one hand and Blood urea (P.value=0.018), serum creatinine (P.value=0.006) and ACR (P.value=0.047) on other hand.

**Table (1.7)** Comparison between those with normal echo finding and abnormal finding

| Variable | Abnormal Echo (n=28) | normal Echo (n=24) | P value |
|---|---|---|---|
| | Mean ±SD | Mean ±SD | |
| Blood urea (mg/dl) | 46.85±34.1 | 29.2±12.39 | 0.020 |
| S.Creatinine(mg/dl) | 0.94±0.53 | 0.83±0.24 | 0.327 |
| Urinary WBC | 6.71±9.11 | 5.83±4.56 | 0.670 |
| ACR(mg/g) | 77.96±38.32 | 59.49±29.31 | 0.447 |
| K(mmol/L) | 3.74±0.50 | 3.94±0.66 | 0.232 |
| Ca(mg/dl) | 8.77±0.50 | 8.95±0.45 | 0.172 |
| Na(mmol/L) | 136.8±4.09 | 138.75±3.89 | 0.089 |
| Cl(mmol/L) | 103.71±5.14 | 105.12±3.28 | 0.254 |

Table above show significant correlation between abnormal structural echo finding (other than AF) and Blood urea ((P.value=0.02)

**Table (1.8)** correlation between number of medications for AF taken by patients and renal indices.

| Renal indices | Number of medication* | | | P value |
|---|---|---|---|---|
| | None (n=34) | One (n=9) | Two (n=9) | |
| Blood urea mg/dl | 32.26±15.69 | 43.11±22.34 | 58.66±25.03 | 0.031 |
| Creatinine mg/dl | 0.79±0.24 | 1.06±0.52 | 1.09±0.72 | 0.069 |
| ACR(mg/g) | 84.46±62.78 | 42.10±27.28 | 121.91±114.42 | 0.107 |
| K(mmol/L) | 3.75±0.33 | 4.31±1.01 | 3.68±0.62 | 0.054 |
| Ca(mg/dl) | 8.90±0.44 | 9.02±0.43 | 8.53±0.60 | 0.071 |
| Na(mmol/L) | 137.85±4.12 | 137.55±4.71 | 137.33±3.64 | 0.939 |
| Cl(mmol/L) | 105.32±3.92 | 104.55±2.87 | 100.55±1.87 | 0.012 |

* include warfarin, bisoprolol, carvedilol, digoxin and metoprolol alone or in combination with aspirin, bisoprolol, carvedilol, digoxin, metoprolol and warfarin.

Table above show significant correlations between using two drugs for AF on one hand and Blood urea (P.value=0.031) and Cl (0.012) on other hand.

**4. Discussion**

Atrial fibrillation (AF) is the commonest type of arrhythmia with multiple serious complications that may effect on morbidity and mortality1,5, one of the important disorder that is associated with AF is renal impairment (AKI and CKD) that cause challenging in management of AF1,6.

In this study, we focus on markers of renal impairments in AF patients.

We randomly choose 52 patients with AF that presented to CCU and include them in cross sectional descriptive study.

Table (1.1) show that the mean age of patients was 59.6±13.1 years (range 31-85) and Age at diagnosis 56.9±14.9 this resemble to epidemiological studies where AF incidence increase with age as in [27] and 95% of patients >60 years old [28]. The gender distribution of patients was 61.45% female and 38.46% male, in contrast to gender distribution in studies where in male slightly greater than female [29], but this difference not necessary reflect the gender distribution of AF in our population may be due to the sample reflect only patients presented to CCU due to symptoms severity and many patients with AF can be asymptomatic and patient with paroxysmal AF not presented to CCU because it is self-limiting condition [25], [30].

Also in table (1.1). All patients presented as palpitation except one presented with chest pain and all patients diagnosed as AF by ECG. 67.3% non-smoker, 25% smoker and x-smoker 7.7%. Six patients in the sample had previously diagnosed as AF and complicated with stroke (labelled).

All patients have one or more abnormal renal indices and Table (1.2) generally show the frequency of these abnormality in the patients, most abnormalities appear in urinalysis (100% of patients) followed by abnormal ACR (48% of patients).

ACR reflect the filtration of albumin in urine that in small amount to be detected by dipstick (moderately increased albuminuria or microalbuminuria) [12], [31]. ACR is a harbinger for CKD and cardiovascular diseases (CHD, stroke or peripheral vascular disease) and the mortality related to it [32].

After review the data of patients with abnormal ACR (25 patients), 4 of them had reading equal or above 300 mg/g and 21 less than this value and all patients had one or more chronic diseases except one patient without any other disease. These diseases (HT=13, DM=11, HF=5, IHD=3, CVA=2, asthma=2, MS=2 and hypothyroidism=1) can be the primary cause of abnormal ACR especially HT, DM, IHD and HF (last two can be considered within cardiorenal syndrome) that can cause renal disorders, but the study of [33] show that abnormally high ACR alone even with normal renal function increase the risk of AF incidence.

So we suggest from our study and the other studies above that abnormally high ACR can be considered as a risk factor and a sequel (like in cardiorenal syndrome) of cardiovascular disease including AF [15].

Blood urea and s.creatinine both can be considered as a mirror for renal function [34]. Blood urea is abnormally elevated in 14 patients (26.92%). Serum creatinine elevated in only 5 patients (9.6%) and 4 of them had also elevation in blood urea. the discrepancy between Blood urea and s.creatinine in this sample firstly seem to be due pre-renal (regardless other indices) but after measurement of urea-creatinine ratio (pre-renal value>100) [35]. this idea is dismissed where the mean value is 64.79±32 (ratio done for patients with abnormally high urea and creatinine). This mean these abnormalities not due to renal perfusion insufficiency or other causes of pre-renal, and if renal injuries present it is more likely to be due to intrinsic causes (intrinsic value 40 to 100) [35]. U/S show only 4 patients with structural urinary abnormality and the data of these patients show only one had features contributed directly with CKD as increase of renal echogenicity with decrease corticomedullary differentiation [36], two patients with single renal cyst and last one show prostate enlargement, So in this sample only one patient had imaging feature of CKD (to confirm CKD, after 3 month repeat U/S) and this expected because one of the samples exclusion criteria is CKD (labelled).

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Serum electrolytes abnormalities mainly in potassium and sodium with frequency for each one 14 patients (26.92%) but it is unreliable that the causes of electrolytes abnormalities are due to renal disorders without others tests like urinary electrolytes measurements [37].

In urinalysis as shown in table (4.3), the most common abnormal finding is urinary WBCs (98%) followed by urinary epithelial cells (76.8%). Urinary WBCs reflect commonly presence urinary tract infection but also can reflect inflammatory process like in interstitial nephritis and glomerulonephritis [38]. Unfortunately, in our urinalysis we cannot exclude the infection cause by urine culture or by other test in asymptomatic patient (urinary symptoms) that admitted to other purpose. Epithelial cells may presented normally due to sloughing of renal tubules cells or may be a marker of active renal disorder or tubular injury [39]. Amorphous urate crystal found in 40 patients (76.9%), these crystals are formed with increasing the acidity in urine. they don't have any clinical significance and usually occur healthy person [40].

Urinary Granular cast which is degeneration of cellular cast may occur in acute tubular necrosis but frequently have unclear clinical significance and occur in healthy persons except coarse deeply pigmented granular cast that characteristic for acute tubular necrosis that only found in one patient [41]. Albuminuria abnormally found by dipstick in 8 patient (15.38%) which when positive represent level equivalent to > 300 mg/24 hour [42]. Albuminuria is a predictor for renal disorder but also had importance in AF, [43] study show proteinuria that detected by dipstick increase risk of AF 40% and if proteinuria resolved the risk significantly decreased, So albuminuria (albumin 60% of protein24) like ACR it regarded itself a harbinger for CKD and cardiovascular diseases, as well as, a cause and result for cardiovascular disease including AF. Nineteen percent of patients had abnormal urine colour (7.69% turbid or cloudy and 3.84% brown). Urine turbidity due to presence of high levels of crystals, cells and /or infection and according to other elements urinalysis and determine the cause [44]. Other gross abnormality in same methods detect the cause (brown due to RBCs, heme or etc... and cloudy due to WBCs or other causes [45]. Most patients in the sample had urinary WBCs and 11.6% had urinary RBCs in different concentrations, so these changes are expected in the sample. Urinary RBCs found in 6 patients, it may represent injury, inflammatory or infection in any part of urinary tract, so it is difficult to depend on urinalysis alone without other tests to determine the cause especially no characteristic features for RBCs in all patients (i.e. glomerular RBCs) [42].

Due to the importance of chronic disease that also linked to AF and renal disorder, table (1.4) show frequency and percentages of these diseases.

HT is the most common chronic disease (38.46%) followed by DM (30.75%) and IHD and HF (each one 9.6%), so in the sample HT is the most common disease associated with AF. Many studies show these diseases above are the common diseases associated and/or causes for AF [4], [6].

Thirteen patients (25%) had only AF without any other chronic disease, but hardly regard these patients have lone AF because this study type not interest the cause of AF, and many other causes and associated conditions not involved e.g. reversible AF causes and obesity. HT, DM, IHD and HF also common causes for renal impairments and can affect the renal indices in the sample, but many authors due to newly diagnosed causes for AF, predict the end of the idiopathic or lone AF [46].

Table (1.5) show that blood urea, s. creatinine and ACR higher in male than females (for male blood urea P.value=0.05, s.creatinine=0.014 and for ACR =0.013, P.value for female all>0.05). These resemble many studies that collected by [47], where in these studies, renal function effected by gender due to many causes like hormonal changes, gender distribution for diseases that cause renal impairment, the rate of renal

impairment progression that more rapid in males and other causes.

Table (1.6) show the correlation between patients with synchronized direct current defibrillator (recently or previously) and renal indices. Patients treated with synchronized DC shock had levels of blood urea P.value=0.018, serum creatinine (P.value=0.006) and ACR (P.value=0.047) higher than that found in patients not treated with synchronized DC.

This correlation can be explained by cardiorenal syndrome type 115 in this syndrome cardiogenic shock (the indication for DC shock in those patients) cause renal impairment as mentioned in introduction.

Table (1.7) show that the blood urea (P.value=0.02) higher in patient with structural echo finding (other than AF). same result found in [48], that conclude higher blood urea nitrogen (blood urea = 2.14 multiple by blood urea nitrogen) itself linked with worse marker for left ventricular diastolic dysfunction as well as right ventricular systolic and diastolic dysfunction. Furthermore, renal impairments also linked with left ventricular systolic dysfunction to and its mortality [49]. After review data for patients with high blood urea we see that 50% (7 from 14 patients) had left ventricular diastolic dysfunction and 6 patients with left ventricular systolic dysfunction alone or with diastolic dysfunction. This correlation explained by same factors for development of cardiorenal syndrome but unclear why effect mainly blood urea.

Table (1.8) show that blood urea level proportionally increase with increasing number of medications that taken patients for treatment of AF (P.value=0.031), as well as, disproportional correlation between number of medications and chloride level (P.value=0.012).

The drugs that used in those patients were warfarin, digoxin, bisoprolol, carvedilol and metoprolol. Warfarin itself as mentioned in introduction above increase risk of AKI [18]. Digoxin and beta-blockers in therapeutic doses not listed to be causes for renal impairment directly [50]. In some old studies correlation appeared with Beta-blockers that cause renal alteration by its effect on renal hemodynamics mainly on vascular resistance especially in hypertensive patients [51]. Polypharmacy itself can cause renal impairment (especially in elderly and other comorbidities) by drug-drug interaction, allergic reaction or one drug prevent protective compensatory mechanism of kidney against another drugs or diseases [52].

As mentioned in table (1.4), 75% of patients in the sample had another one or more chronic diseases and use drugs for these diseases plus drugs for AF management, so highly suspension to drug-drug interaction (especially warfarin and digoxin) and to decompensation of the renal protective mechanism against drugs or diseases. Only blood urea effected that also unclearly understood.

The chloride level that shown in this table not clinically significant because it still in normal reference ranges(100.55±1.87) [24].

**5. Conclusion**

Many Renal indices in this sample are abnormal. Some of these indices clinically insignificant like granular cast and amorphous urate, but others abnormalities are significant like blood urea, s.creatinine, albuminuria and ACR and these indices effected by many factors including gender, using of DC shock, echo abnormalities and number of medications for AF where male gender significant correlated with blood urea, s.creatinine and ACR. DC shock also significantly correlated with blood urea, s.creatinine and ACR. Abnormal echo finding especially diastolic LV dysfunction significantly correlated with blood urea, and number of medications that used for AF significantly correlated to blood urea. Comorbid disease in patients

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with AF and its medications can be play a vital role in these indices. Some indices that were abnormal in this study like electrolytes and urinary WBCs need more follow up and investigations to confirm these abnormalities contributed to renal impairments i.e. these abnormalities regarded as renal indices or indices for other system.

Recommendations

1. Extended prospective study for renal function in AF patients and its relationships with treatments
2. Assessment cardiac diseases and metabolic syndrome in patients with renal impairments.
3. Case control studies for evaluate correlations between gender, DC shock, echo finding and number of medications in AF patients in one hand and renal impairments in other hand

Limitations

1- This study is descriptive cross sectional study in which the temporal relationship cannot be assessed and routinely collected data does not normally describe which variable is the cause.
2- Some of data that collected were depending on patients' orientation and medical care e.g. concurrent HT and IHD
3- unfortunately, No identical study present in our country for compare the result of this research with it, as well as, some results and conclusions in this study cannot be underwent to comparison due to lack of published studies interest these results e.g. effect of DC shock in AF patients on renal indices.
4- Because of decrease of resources, the cost and unavailability of novel tests and the technical limitations, the measurement of renal indices by these methods not reflect the exact extension of renal impairments perfectly.
5- Unfortunately, no consensus-standardized studies demonstrate the epidemiology and mortality of AF or renal impairments in Iraqi patients.

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