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Original Research

Epidemiology of the Renal Failure at Thi-Qar Province

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Abstract:

Background: Renal failure is a worldwide health problem. The incidence and prevalence of renal failure is in constant increase, involving poor outcomes and high costs. The major leading causes of kidney failure are type 2 diabetes and hypertension.

Objective: To study the epidemiology of renal failure in Dhi Qar province.

Patients and Methods: A cross sectional study including a review of 188 cases of Renal Failure recorded in Kidney dialysis center at Al-Hussein Teaching Hospital in Dhi Qar for the period from December 1, 2022 to March 20, 2023. The collected data was analyzed by using computer, excel and using of SPSS-24. All the variables were analyzed by number, proportion and percentage.

Results: Males was about 40.2% and females was 59.5%. The reasons of Renal failure ratio was diabetes about 19.36%, Hypertension about 12.23%, Unknown cause about 17.55%, Glomerilonephritis about 5.3%. Obstructive nephropathy about 3.16%, Congenital about 2.8% and others about 4.22%. The major co- morbidities in renal failure patient on Hemodialysis was anemia about 46.80%, Hypertension about 29.25%, Heart failure about 4.57%, Ischemic heart disease about 10.56% and Cerebrovascular accident about 0.7%.

Conclusion: The incidence rate was high and the prevalence rate was low due to low survival.

Keywords: Renal Failure, Thi-Qar Province, prevalence, Epidemiology

1. Introduction:

1.1-Introduction

Kidney failure, also known as end-stage kidney disease, is a medical problem in kidney failure AKF (develop rapidly) and chronic kidney failure CRF (long term development). Symptoms may include leg swelling, feeling tired, loss of the appetite, vomiting or confusion. Complications of acute disease may include uremia, or volume overload, high blood potassium Complications of chronic disease may includes high blood pressure, heart disease, or anemia [1].

There was no enough information on how to better screen and prevent for the disease, That increasing incidence rate of CRF warrants a need for an epidemiological approach to better demonstration the disease and its prevention. While statistics have been identified concerning world demographics [2].

Epidemiology is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems [3].

Renal diseases are estimated in terms of comprehensively renal function glomerular filtration rate (GFR) and the existence of kidneys damage confirmed by either kidney tissues biopsies or another markers of kidney damage. Chronic kidney disease is a common medical condition in which there is a loss of kidney function over time (15). Chronic kidney diseases was associated with increased risks of many co-morbidities; not limited to but including chronic renal failure and cardiovascular disease CKD is an emergent worldwide public health problem. which the kidneys no longer function. The renal failure was subdivided in to acute. The prevalence of end-stage renal disease (ESRD) is increasing in the United States. Chronic kidney disease is increasingly common nations [2]. in developing and developed.

Chronic renal failure (CRF) is renal failure, which is generally progressive and nonreversible. Presently, the most common cause of CRF is diabetes related renal disease. Fifty to 60 percent of CRF is of diabetic origin. Frequently, the term end stage renal disease (ESRD) is used for advanced CRF [4].Awareness of the disorder, however, remains low in many communities and among many physicians. The incidence of end-stage kidney disease has been reduced, where management strategies have been implemented Screening and intervention can prevent chronic kidney disease [5].

2-Etiology:

Renal Failure Etiopathogenesis:

1.2.1-Acute Renal Failure:

1-Prerenal (approximately 60%): Hypotension, volume contraction (e.g., sepsis, hemorrhage), severe organ failure such as heart failure or liver failure, drugs like non- steroidal anti-inflammatory drugs (NSAIDs), angiotensin receptor blockers (ARB) and angiotensin-converting enzyme inhibitors (ACEI), and cyclosporine

2-Intrarenal (approximately 35%): Acute tubule necrosis (from prolonged prerenal failure, radiographic contrast material, drugs like aminoglycosides, or nephrotoxic substances), acute interstitial nephritis (drug-induced), connective tissue disorders (vasculitis), arteriolar insults, fat emboli, intrarenal deposition (seen in tumor-lysis syndrome, increased uric acid production and multiple myeloma-Bence-Jones proteins), rhabdomyolysis

3-Postrenal (approximately 5%): Extrinsic compression (prostatic hypertrophy, carcinoma), intrinsic obstruction (calculus, tumor, clot, stricture), decreased function (neurogenic bladder) [6]

1.2.2-Chronic Renal Failure:

- Diabetes mellitus, especially type 2 diabetes mellitus, is the most frequent cause of ESRD.
- Hypertension is the second most frequent cause.
- Glomerulonephritis
- Polycystic kidney diseases

- Renal vascular diseases
- Other known causes, like prolonged obstruction of the urinary tract, nephrolithiasis [7]

1.3-Epidemiology:

- The incidence of AKI has been cited as 1% on hospital admission, 2% to 5% during hospitalization, and in as many as 37% of patients treated in intensive care units (ICUs), and in 4% to 15% of patients after cardiovascular surgery. [7]
- Overall, the incidence of AKI has been estimated to be 209 patients per million population per year, with 36% of patients with AKI requiring renal replacement therapy. [7]
- The incidence and prevalence of CRF in the United States are uncertain. The third National Health and Nutrition Examination Survey (NHANES III) shows that almost 2 million people in the United States have a serum creatinine level of 2 mg/dl or greater. [8]
- CRF is known to be more prevalent in men than in women. This gender disparity extends to ESRD.
- ESRD develops in over 100,000 persons a year in the United States. [7], [8]
- Rates of ESRD vary with race. Both the incidence and prevalence of ESRD are three to four times higher in blacks than in whites. [8]

1.4-Pathophysiology:

Renal failure pathophysiology can be described by a sequence of events that happen while during acute insult in the setting of acute renal failure and also gradually over a period in cases of chronic kidney diseases.

Broadly, AKI can be classified into three groups:

1. The decrease in renal blood flow (prerenal azotemia): Prerenal AKI occurs secondary to either an absolute reduction in extracellular fluid volume or a reduction in circulating volume despite a normal total fluid volume, e.g., in advanced cirrhosis, heart failure, and sepsis. Normally kidney auto-regulatory mechanism maintains intra-capillary pressure during initial phase by causing dilation of afferent arterioles and constriction of efferent arterioles. When prerenal conditions become severe, renal adaptive mechanisms fail to compensate unmasking the fall in GFR and the increase in BUN and creatinine levels. [9]

2. Intrinsic renal parenchymal diseases (renal azotemia): Intrinsic disorders can be sub- divided into those involving the glomeruli, vasculature, or tubulointerstitium respectively.

3. Obstruction of urine outflow (postrenal azotemia)

The pathophysiology of CRF is related mainly to specific initiating mechanisms. Over the course of time-adaptive physiology plays a role leading to compensatory hyperfiltration and hypertrophy of remaining viable nephrons. As insult continues, sub sequentially histopathologic changes occur which include distortion of glomerular architecture, abnormal podocyte function, and disruption of filtration leading to sclerosis. [10]

1.5- Evaluation:

Patients with renal failure have a variety of different clinical presentations as explained in the history and physical exam section. Many patients are asymptomatic and are incidentally found to have an elevated serum creatinine concentration, abnormal urine studies (such as proteinuria or microscopic hematuria), or abnormal radiologic imaging of the kidneys. The key laboratory and imaging studies to be ordered in patients with renal failure follow. [10]

1.5.1-Laboratory Tests:

● Urinalysis, dipstick, and microscopy

1. Dipstick for blood and protein; microscopy for cells, casts, and crystals

2. Casts: Pigmented granular/muddy brown casts-ATN; WBC casts-acute interstitial nephritis; RBC casts-glomerulonephritis

Urine electrolytes

Fractional excretion of sodium (FENa) = [(UNa x PCr)/ (PNa x UCr)] x 100, where U is urine, P is

plasma, Na is sodium, andCr is Creatinine. If FeNa less than 1, then likely prerenal; greater than 2, then likely intrarenal; greater than 4, then likely postrenal

If the patient is on diuretics, use FEurea instead of FENa. Complete blood count, BUN, creatinine (Cr), arterial blood gases (ABGs) [11]

Calculate Cr clearance to ensure that medications are dosed appropriately:

Cockcroft-Gault equation Cr clearance (mL/min) = (140-age) x (weight in kilograms) x (0.85 if female)/(72 x serum creatinine)

1.5.2-Special Labs

• Creatinine Kinase (CK)

Immunology antibodies based on the clinical scenario:

Imaging:

- Renal ultrasound (US)
- Doppler-flow kidney US depending upon the clinical scenario
- An abdominal x-ray (KUB): Rules out renal calculi
- More advanced imaging techniques should be considered if initial tests do not reveal etiology:
- Radionucleotide renal scan, CT scan, and/or MRI
- Cystoscopy with retrograde pyelogram Kidney biopsy[12]

1.6- Treatment / Management:

Treatment options for renal failure vary widely and depend on the cause of failure. Broadly options are divided into two groups: treating the cause of renal failure in acute states versus replacing the renal function in acute or chronic situations and chronic conditions. Below is the summary of renal failure treatment. [12]

1.6.1-Acute Renal Failure:

● Mainstay is treating the underlying cause and associated complications

• In case of oliguria and no volume, overload is noted, a fluid challenge may be appropriate with diligent monitoring for volume overload

• In the case of hyperkalemia with ECG changes, IV calcium, sodium bicarbonate, and glucose with insulin should be given. These measures drive potassium into cells and can be supplemented with polystyrene sulfonate, which removes potassium from the body. Hemodialysis is also an emergency method of removal.

Oliguric patients should have a fluid restriction of 400 ml + the previous day's urine output (unless there are signs of volume depletion or overload).

If acidosis: Serum bicarbonate intravenous or per oral, versus emergency/urgent dialysis based on the clinical situation

• If obstructive etiology present treat accordingly and or if bladder outlet obstruction secondary to prostatic hypertrophy may benefit from Flomax or other selective alpha-blockers. [13]

1.6.1.1-General Measures:

● First things first, always review the drug list.

Stop nephrotoxic drugs and renally adjust others. Many supplements not approved by the FDA can be nephrotoxic.

Ensure good cardiac output and subsequent renal blood flow. [11]

Treat infections aggressively. [9]

1.6.1.2-Immediate Dialysis Indications:

- ❖ Severe hyperkalemia
- ❖ Acidosis
- ❖ Volume overload refractory to conservative therapy
- ❖ Uremic pericarditis
- ❖ Encephalopathy

Alcohol and drug intoxications [13]

1.6.2-Chronic Renal Failure:

Optimize control of specific causes of CKD such as diabetes mellitus and hypertension

• Measure sequentially and plot the rate of decline in GFR in all patients

Any acceleration in the rate of decline should prompt a search for superimposed acute or subacute process that may be reversible

Rule out extracellular fluid volume depletion, uncontrolled hypertension, urinary tract infection, new obstructive uropathy, exposure to nephrotoxic agents (such as NSAIDs or contrast dye), reactivation or flare of the original disease such as lupus or vasculitis

- ❖ Interventions to slow the progression of CKD
- ❖ Reduce intra-glomerular filtration
- ❖ Discuss renal replacement therapy with patients appropriately and timely
- ❖ Periodically review medications and avoid nephrotoxic medicines. Dose renally excreted medications appropriately. [14]

1.7-Differential Diagnosis:

Acute kidney injury

-Alport Syndrome

-Antiglomerular Basement membrane disease

chronic glomerulonephritis:

- ❖ Diabetic neuropathy
- ❖ Multiple Myeloma
- ❖ Nephrolithiasis
- ❖ Nephrosclerosis [14]

Patients and Methods:

2.1-patients and methods:

A cross-sectional study was conducted in the dialysis center of Al-Hussein Teaching Hospital in Thi-Qar Governorate for the period from December 1, 2022 to March 20, 2023. All patients were diagnosed with CKD and HD in Thi-Qar Province, including different sexes and ages. We reviewed all diagnosed patients (and their medical records) with the permission of the dialysis center physicians and the special questionnaire format used to address issues vital to the study. 188 patients were diagnosed with renal failure and started dialysis, and they were diagnosed by specialized doctors in this center and/or were referred from private clinics. Patients were classified according to a questionnaire containing age, gender, address, causes of renal failure, comorbidities, and withdrawal from the HD program.

2.2-Statistical analysis:

The collected data was analyzed by using computer, excel and SPSS-24 (Statistical Packages for Social Sciences- version 24). All the variables were analyzed by number, proportion and percentage.

2.3- Results:

During the year 2023, the incidence of kidney failure in dialysis reached 188 patients in Dhi Qar Governorate.

Distribution of patient with renal failure on Hemodialysis according to the gender: In the current study, among (188) renal failure patients, 76 (40.2%) was male and 112 (59.5%) were females, shown in Table [1].

Table (1): Distribution of patient with RF according to the gender

Gender	No	Percent
Male	76	40.2%
Female	122	59.5%
Total	188	100 %

Distribution of patient with Renal failure on HD according to the age: From (188) patients who have renal failure on HD included this study, the age distribution was less than 20 years 11 (3.8%), from 21-40 years was 55 (19.36%), from 41-60 years was 90(47.87%), from 61-80 years 30 (15.95%), and > 80 there is 2 (0.7%) shows in table (2). About 50% of patients were (50-69) year's age.

Table (2): Distribution of patient with RF according to the Age group

Age group	No	Percent
less than 20 years	11	3.8%
21- 40 years	55	19.36%
41-60 years	90	47.87%
61-80 years	30	15.95%
> 80	2	0.7%

Distribution of patient with renal failure on HD according to the address. Among (188) patients renal failure on HD, 143 (50.35%) was from Nasiriyah city, 69 (24.29%) was from Souq Al-Shuyukh district, 31 (10.9) was from Al-Rifai district, 21 (7.39%) was from Sayed Dakhil district and 20 (7.04%) was from Alnasr Districtshown in Table (3). The highest prevalence of CKD according to population were from Souq Al-Shuyukh district (363.15 PMP) and Nasiriyah city (250.4 PMP).

Table (3): Distribution of patient with Renal failure on HD according to the address

Address	No	Percent
Nasiriyah	143	50.35%
Souq Al-Shuyukh	69	24.29%
Al-Rifai	31	10.9
Sayed Dakhil	21	7.39%
Alnasr	20	7.04%
Total	188	100 %

Distribution of patient with renal failure on HD according to the reasons of renal failure:Among (188) patients renal failure on HD, the cause of RF was the DM in 55 (19.36%), hypertension in about 23 (12.23%),glomerulonephritis in about 15 (5.3%), obstructive uropathy in about 9 (3.16%), congenital in about 8 (2.8%), unknown in about 33(17.55%) and other causes was 12 (4.22%) shows in Table (4).

Table (4): Distribution of patient with renal failure on HD according to the reasons

Causes	No	Percent
Hypertension	23	12.23%
Diabetes mellitus	55	19.36%
Glomerulonephritis	15	5.3%
Obstructive nephropathy	9	3.16%
Congenital	8	2.8%
Unknown	33	17.55%
other causes	12	4.22%
Total	188	100%

Distribution of patient with renal failure according to the co-morbidities during hemodialysis: Among (188) patients renal failure on HD anemia in about 88 (46.80%), Hypertension in about 55 (29.25%), HF in about 13 (4.57%), IHD in about 30 (10.56%), CVA in about 2 (0.7%) in Table (5).

Table (5): Distribution of patient with RF on HD according to the co-morbidities

co-morbidities	No	Percent
Anemia	88	46.80%
Hypertension	55	29.25%
Heart failure	13	4.57%
Ischemic heart disease	30	10.56%
Cerebrovascular accident	2	0.7%

Discussions:

Renal failure relation to the gender in our study the male patients percent was 76(40.2%) and female patients percent was about 122 (59.5%).

The male is more than female because the female is a burden in low socioeconomic state families and education in our society mostly in female.

There was high ratio unknown causes patient on HD due to poor patient history of the disease, poor imaging studies diagnosis, late referral, patient family neglection and refusing renal biopsy taking due to weak possibilities to yield the cause.

Distribution of patient with renal failure according to their co-morbidities during HD was the major co-morbidity was anemia in about (46.80%).

There was high percent of unknown causes due to late diagnosis, late referral, bad management on early stage 1, 2 and 3 CKD and insufficient imaging study diagnosis.

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