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Dhifaf Zeki Aziz
Department of Pathological Analysis, Faculty of Sciences, University of Kufa, Iraq

Ruqaya Ali Mahdi
Department of Pathological Analysis, Faculty of Sciences, University of Kufa, Iraq

Mustafa Ammar Mahdi
Department of Pathological Analysis, Faculty of Sciences, University of Kufa, Iraq

Zainab Muwafaq Talib
Department of Pathological Analysis, Faculty of Sciences, University of Kufa, Iraq

Ahmed Hussein Mohsin
Department of Pathological Analysis, Faculty of Sciences, University of Kufa, Iraq

Esraa Zeman Dayea
Department of Pathological Analysis, Faculty of Sciences, University of Kufa, Iraq

Corresponding Author:
Dhifaf Zeki Aziz
Department of Pathological Analysis, Faculty of Sciences, University of Kufa, Iraq

Assessment of some hematological and biochemical parameters in patients with renal failure in Al-najaf province

Dhifaf Zeki Aziz, Ruqaya Ali Mahdi, Mustafa Ammar Mahdi, Zainab Muwafaq Talib, Ahmed Hussein Mohsin and Esraa Zeman Dayea

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Abstract
Chronic renal failure is a condition in which the kidneys gradually lose their ability to function because of the gradual loss of their parenchyma. This study aimed to detect some hematological and biochemical parameters in patients with chronic kidney disease (CKD) attending a hemodialysis center. A cross-sectional study included a review of (89) cases of chronic kidney disease at Al-Hakeem Hospital's dialysis center in Najaf from September 7th to October 16th, 2021. The collected data were analyzed using Office Excel and SPSS-23. Variables were analyzed by frequencies, proportions, and percentages. The current study discovered that males had longer sequences than females, and that patients in rural areas had longer sequences than those in urban areas. In the current study, blood Sug, B. Urea, S. Crea, K, Na, Cl, Ca+2, Alb, and Tpro levels did not differ significantly between males and females with renal failure, whereas HB and TCA levels did. At last, we recommend people conduct an early medical examination for kidney disease, especially those who suffer from symptoms such as low urine output, swelling of the legs, fatigue, tachycardia, and others, to obtain early treatment.

Keywords: Chronic renal failure, biochemical parameters, hematological parameters

Introduction
Kidney illness is incredibly diverse, exemplifying many different types of disease processes including inflammation, immunological mediation, hereditary predisposition, vascular disease, and cancer. (Herrington, 2020) [7]. Chronic renal failure is the gradual and irreversible loss of renal function caused by the gradual degradation of renal parenchyma, leading to death after a sufficient number of nephrons have been damaged (Calderon-Margalit *et al*., 2018) [2]. As a consequence of this, the body is unable to maintain its metabolic, fluid, and electrolyte balance(Khadka *et al*., 2020), which may result in the evolution of one of the two major pathological syndromes: acute renal failure and chronic renal failure. The term 'azotemia' is used for biochemical abnormality characterized by elevation of the blood urea nitrogen (BUN) and creatinine levels, while 'uremia' is defined as association of these biochemical abnormalities with clinical signs and symptoms (Chertow *et al*., 2005) [22]. Kidney disease can be caused by a number of different things, including obesity, high blood pressure, and diabetes mellitus (DM). Rapid kidney failure can develop in people with uncontrolled diabetes or hypertension (Kazanciolu, 2013) [10]. Other causes of acute kidney injury include glomerulonephritis, genetic problems, medications, cardiovascular illness, multisystem diseases, urinary tract blockage, and infections (Noble & Taal, 2019) [17]. Rapid decline in kidney function is a common symptom, typically calling for renal replacement therapy (dialysis or transplantation). End-stage renal disease (ESRD) is a term used to describe a situation in which a patient needs dialysis or a kidney transplant (Chertow *et al*., 2005) [22]. Dialysis is a procedure used to purify the blood by eliminating impurities and excess fluid. It's a method of artificially restoring kidney function, typically in patients with renal failure. Dialysis cannot fully replace kidney function but can control its activities through diffusion and ultrafiltration. When the body's defenses are weakened, it's more vulnerable to the damaging effects of procedures like this one, which may lead to oxidative stress. (Vadakkath *et al*., 2017; Aziz *et al*., 2019) [20, 1].
Blood pressure (BP) is measured with the use of a sphygmomanometer, and it is the force with which blood flows through a blood vessel while the heart pumps blood. Having hypertension increases the likelihood of developing kidney disease, and when combined with

other risk factors, it may cause chronic renal failure. A healthy adult's blood pressure is 120/80 mmHg (systolic, or when the heart beats, and diastolic, or when the heart rests; the heart relaxes). It is called hypertension if it is more than this (Han *et al*., 2017) [4]. The aim of the present investigation is to identify variations in hematological and biochemical markers in patients with chronic renal failure in Al-Najaf province.

Methods

This research was a cross-sectional analysis of data collected from September 7, 2021, to October 16, 2021. The hemodialysis units (HDU) of Al-Hakim Hospital in Najaf, Iraq, were the sites of this research. Patients were either part of a scheduled dialysis program, were referred from another hospital, or were in need of emergency dialysis when they were chosen.

Target patients

Renal failure patients might experience varying degrees of decline over time. And in the end, this leads to kidney failure. It was hemodialysis that kept the patients alive. A hemodialysis clinic offers this treatment. Dialysis is performed at the facility on a patient twice or thrice weekly for an average of three to four hours each time.

Data collection procedure

This research used data from four different hemodialysis units in the city of Al-Najaf. After obtaining approval from the hospital's central unit. The pre-tested questionnaire was filled up by taking available records for collecting hematological and biochemical parameters like values of blood HB, Sug, B. Urea, S. Crea, K, Na, Cl, Ca+2, Tca, Alb, Tpro and viral infections results.

Inclusion criteria

Patients undergoing maintenance hemodialysis using an arteriovenous fistula (AVF) at a designated hemodialysis facility.

Exclusion criteria

- A patient with acute renal failure.
- Patients who have had surgery in the recent past.

Statistical analysis

After data gathering was complete, accuracy was double verified. Data modification was used to keep quality high. Each variable's data was coded and put into the SPSS programme.

Results

The present study found that among the sampled population, 23 (42.593%) were males, and 31 (57.407%) were females as shown in table (1).

Table 1: Distribution results of patients with renal failure on hemodialysis according to age group and gender.

Age group	Males		Females		Total	
	N	%	N	%	N	%
10-25	2	3.703	7	12.963	9	16.666
26-40	3	5.555	10	18.518	13	24.073
41-55	8	14.814	8	14.814	16	29.629
56-75	9	16.666	7	12.963	16	29.629
Total	23	42.593	31	57.407	54	99.999

The present study found that among the sampled population,47 (52.808%) were males, and42 (47.191%) were females as shown in table (2).

Table 2: Distribution results of patients with renal failure on hemodialysis according to gender.

Gender	N	%
Males	47	52.808
Females	42	47.191
Total	89	99.999

The present study found that among the sampled population, 36(66.66%) were from rural areas, 18 (33.33%) were from Urban as shown in table (3).

Table 3: Percentages of renal failure patient's distribution according to (Urban & Rural areas in Najaf)

District	N	%
Urban	18	33.33
Rural areas	36	66.66
Total	54	99.99

The present study found that among the sampled population, patients with HIV infection have (89) negative results and (zero) positive results while patients with HBS infection have (87) negative results and only (two) positive results but patients with HCV have (52) negative results and (37) positive results as shown in table (4) and figure (1).

Table 4: results of patients with renal failure on hemodialysis according to viral infections.

Group	Positive		Negative	
	N	%	N	%
HIV	0	0.0	89	100
HBS	2	2.24	87	97.75
HCV	37	41.57	52	58.42

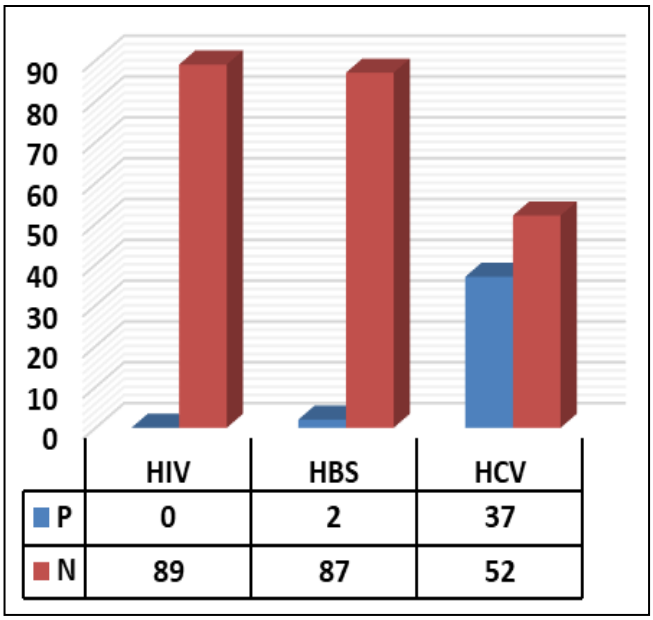

Fig 1: Results of patients with renal failure on hemodialysis according to viral infections

In the present study show the blood HB, Sug, B. Urea, S. Crea, K, Na, Cl, Ca+2, Tca, Alb, Tpro for total patients with renal failure on hemodialysis.

Table 5: The mean ± standard deviation for total patient parameters with renal failure on hemodialysis.

Parameters	Total Number (89)		p-value
	Mean	SD	
HB	9.76	±1.66	0.00
Sug	123.4	±86.90	0.149
B. Urea	162.66	±43.45	0.00
S. Crea	9.61	±2.82	0.00
K	6.37	±1.85	0.00
Na	144.33	±6.57	0.00
Cl	108.44	±16.09	0.043
Ca^{+2}	1.11	±0.17	0.00
Tca	8.79	±1.28	0.00
Alb	37.8	±5.63	0.00
Tpro	68.88	±11.58	0.00

*means significant difference at ($p \leq 0.05$).

HB (Hemoglobin):14g/dL Sug (sugar):110mg/dL B. Urea (Blood): 20 mg/dL S. Crea (Serum creatinine): 1.2mg/dL, K (Potassium): 4.6 mmol/L Na(Sodium):140 mEq/L, Cl(Chloride): 105mEq/L,Ca^{+2}(Calcium): 10.2mg/dL, Tca (Tricyclic Antidepressants): 200ng/mL, Alb (Albumin):5.4 g/dL Tpro (Total Protien):80 mg/ dL.

In the present study blood Sug, B. Urea, S. Crea, K, Na, Cl, Ca+2, Tca, Alb, Tpro were significantly Increased ($p \leq 0.05$) in male group (132.29±97.35, 159.61±41.09, 9.61±2.82, 6.17±1.89, 144.46±8.51, 110.46±4.15, 1.13±0.14, 8.87±1.12, 38.25±5.34, 69.57±11.77) respectively as compared with the female group (113.50±73.38, 166.07±46.22, 8.98±2.76, 6.59±1.79, 144.19±3.38, 111.40±3.26, 1.10±0.19, 8.71±1.45, 37.26±5.91, 68.11±11.46). where is HB, Tca was changed significantly ($p \leq 0.05$) as shown in table (6).

Table 6: The mean ± standard deviation for males and females with renal failure on hemodialysis.

Parameters	Male Number (47)		Female Number (43)		p-value
	Mean	SD	Mean	SD	
HB	9.88	±1.95	7.46	±0.74	0.00
Sug	132.29	±97.35	113.50	±73.38	0.14
B. Urea	159.61	±41.09	166.07	±46.22	0.47
S. Crea	9.61	±2.82	8.98	±2.76	0.66
K	6.17	±1.89	6.59	±1.79	0.59
Na	144.46	±8.51	144.19	±3.38	0.15
Cl	110.46	±4.15	111.40	±3.26	0.25
Ca^{+2}	1.13	±0.14	1.10	±0.19	0.08
Tca	8.87	±1.12	8.71	±1.45	0.05
Alb	38.25	±5.34	37.26	±5.91	0.81
Tpro	69.57	±11.77	68.11	±11.46	0.86

*means significant difference at ($p \leq 0.05$).

Discussion

A cross-sectional study included a review of (89) cases of chronic kidney disease at Al-Hakeem Hospital's dialysis center in Najaf from September 7th to October 16th, 2021. The collected data were analyzed using Office Excel and SPSS-23. Variables were analyzed by frequencies, proportions, and percentages.

The present study found that the percentage of males was greater than that of females, and this agreed with the study conducted in Washington County, Maryland (Haroun *et al*., 2005). Human research overwhelmingly shows that males, as opposed to females, have a quicker progression of non-diabetic kidney disease. There is some evidence that being a man increases the likelihood that diabetic nephropathy may worsen. By controlling the production of a wide variety of cytokines, growth factors, and vasoactive agents, sex hormones have far-reaching effects on cellular function. (Neugarten and Golestaneh, 2013) [16].

The percentage of males was lower than that of females, which contradicts the findings of the Turkish study. The current study discovered that the percentage of patients in rural areas was higher than in urban areas, which is consistent with research from Pakistan and other South Asian countries. (Kamil *et al*., 2021) [11] and this may be due to the lower health literacy and CKD knowledge of the former, which may delay diagnosis and treatment. (Min *et al*., 2018) [14].

Damage to the kidneys is common in the elderly due to age-related decreases in glomerular filtration and chronic disease states such as diabetes mellitus, hypertension, glomerular, and tubulo-interstitial diseases. Many older people nowadays need dialysis or a kidney transplant because they have reached end-stage renal disease. (Hansberry *et al*., 2005) [5]. In the current study, blood Sug, B. Urea, S. Crea, K, Na, Cl, Ca+2, Alb, and Tpro levels did not differ significantly between males and females with renal failure, whereas HB and TCA levels did. Patients with chronic kidney disease (CKD) develop anemia due to a combination of factors, including a decrease in hemoglobin (Hb) levels and a consequent decrease in erythropoietin (EPO) production. (Jing *et al*., 2012) [9].

In this study, we noticed a progressive increase in B. Sug levels due to tissue insulin resistance, especially muscle tissue insulin resistance, which is caused by the accumulation of uremic toxins and elevated parathyroid hormone levels in individuals with chronic renal failure (CRF). This is because glucose metabolism and glycogen formation are disrupted once insulin binds to its receptors and suffers damage. (Nasri and Kopaei, 2015). The increase in blood urea levels associated with the marked reduction in glomerular filtration rate (GFR), as The value of urea depends on and reflects GFR: as GFR declines, plasma or serum urea rises (Higgins *et al*., 2016) [8].

Because of its inadequacy as a filtration signal, tubular cells release creatinine into the tubular lumen. An increase in serum creatinine levels is due to reduced tubular secretion of creatinine if there is renal failure (Nankivell, 2001) [15].

Patients with chronic kidney disease (CKD) often have hyperkalemia. Medications used to slow the development of CKD or manage related conditions, including diabetes and heart failure, are linked to an increase in blood potassium levels because they inhibit renal ion excretion. (Yamada and Inaba, 2021) [21].

Adaptive upregulation of the per-nephron sodium excretion rate in the face of a decreasing total glomerular filtration rate is a hallmark of progressive chronic renal insufficiency. Expansion of intravascular volume and renal failure both enhance the release of natriuretic peptides, including atrial natriuretic peptide, which contributes to the observed rise. (Shemin *et al*., 1997) [19]. An altered albumin level due to a systemic inflammatory state is strongly correlated with mortality in ESRD patients. Because of the correlation between decreased GFR and decreased serum albumin concentration, (Lang and Katz, 2018) [13].

Conclusion

HB was decreased significantly, but other parameters didn't show significant statistical differences in patients with renal

failure compared between males and females. The decrease in Hb is associated with the development of anemia in CKD patients, so anemia is a risk factor for CKD. Patients in rural areas outnumber those in urban areas, men outnumber women, and the elderly outnumber the young.

Conflict of Interest: None to declare

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