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

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Abstract

Chronic renal failure is a condition in which the kidney's ability to function is gradually lost so that 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 (Kazancioliu, 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]. 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, 47 (52.808%) were males, and 42 (47.191%) were females as shown in table (2).

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>47</td>
<td>52.808</td>
</tr>
<tr>
<td>Females</td>
<td>42</td>
<td>47.191</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>99.999</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>District</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>18</td>
<td>33.33</td>
</tr>
<tr>
<td>Rural areas</td>
<td>36</td>
<td>66.66</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>99.99</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Group</th>
<th>Positive</th>
<th>Negative</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>0</td>
<td>89</td>
<td>0.0</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HBS</td>
<td>2</td>
<td>87</td>
<td>2.24</td>
<td>97.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCV</td>
<td>37</td>
<td>52</td>
<td>41.57</td>
<td>58.42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

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>
<thead>
<tr>
<th>Age group</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>10-25</td>
<td>2</td>
<td>3.703</td>
<td>7</td>
</tr>
<tr>
<td>26-40</td>
<td>3</td>
<td>5.555</td>
<td>10</td>
</tr>
<tr>
<td>41-55</td>
<td>8</td>
<td>14.814</td>
<td>14</td>
</tr>
<tr>
<td>56-75</td>
<td>9</td>
<td>16.666</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>42.593</td>
<td>31</td>
</tr>
</tbody>
</table>

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

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

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

Table 4: results of patients with renal failure on hemodialysis according to viral infections.
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) [3]. In the current study, blood Sug, B. Urea, S. Crea, K, Na, Cl, Ca, Tca, 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 doesn'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

References