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Associations of C-RP with Renal Function Group and Some Clinical Parameters in Patients with Dialysis in Iraq

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Abstract

Introduction: *Chronic kidney disease is a disease for which there are high mortality rates among those infected with many complications, including high rates of inflammation, anaemia, osteoporosis, and other complications.* ***Methods:*** *The current study was designed to evaluate the kidney functions of patients undergoing dialysis, where levels were evaluated Urea, Uric Acid, and Creatinine, in addition to C-Reactive Protein as a progressive of inflammation parameter, and to evaluate anaemia levels in patients. This study will be conducted in the Department of Medical Laboratory Techniques, Al-Furat Al-Awsat Technical University, and the Specialized Centre for Kidney Diseases and Transplantation, Sadr Medical City, Najaf Governorate.* ***Results:*** *A total of 39 patients with chronic renal failure undergoing maintenance haemodialysis who were admitted to the hospital from March 2022 to January 2022 were selected as subjects. All parameters CRPmg/LS.cr µmol/L, S. urea(mmol/L), S. Uric acid (mg/dl), Albumin(g/dl), Haemoglobin(g/L), iron µmol/L, RBCs, WBCs p-value <0.05 between case-control study are Statistically significant.* ***Conclusion:*** *High inflammatory rates and increased anaemia are among the most important signs accompanying chronic kidney failure and those undergoing dialysis. High inflammatory rates and high urea and creatinine are among the causes of future complications in patients, which are the main cause of death.*

Keywords: CRF, C-reactive protein, dialysis, uric acid, urea, creatinine iron

INTRODUCTION

Chronic renal failure CRF is a disease that causes high mortality rates among those infected with many complications, including high rates of inflammation, anemia, osteoporosis, and other complications [1]. Globally, chronic kidney disease is a public health cause of concern because of the progressive incidence and prevalence of renal failure, poor outcomes, and high costs. Unfortunately, identified until after 75% of renal function has been lost, chronic kidney disease is underdiagnosed and undertreated, leading to missed opportunities for prevention [2]. Based to the WHO, non-communicable diseases are the leading cause of illness and death in Iraq (Iraqi Ministry of Health, 2019) [3]. It is estimated that 30% of Iraqis suffer from high blood pressure, 14% suffer from diabetes, and more than 30% of diabetics suffer from heart disease [4, 5]. The number of patients arriving at dialysis centers in Iraq ranges between 12,000 and 15,000 per week. As for the governorates, Baghdad Governorate ranked first in the number of kidney failure patients, as the number of hospitalized and visiting patients reached 24,654 patients, followed by Najaf Governorate with 10,610 patients, followed in third place by Basra Governorate with 5,978 patients (House of Representatives Research and Studies Department) [6]. According

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to statistics from the Iraqi Ministry of Health, the number of infections is on the rise, and there is a slight increase among males compared to females. Numerous chemicals are strongly linked to human diseases, such as neurologic, endocrinologic, and neoplastic disorders, at the levels of current exposure, according to epidemiologic studies. Several genetic and environmental factors are causing increased risk factors for developing kidney disease and resulting in Kidney failure. Elevated CRP levels in CRF patients are observed, indicating a correlation with cardiovascular disease [7, 8]. Patients undergo hemodialysis, clinical demonstrate CRP has strong correlation with higher predicted of death [9, 10]. Even though there is little data on CRP levels in renal failure before dialysis [11]. Considering this, the current study was conducted to evaluate serum uric acid and CRP [12], levels in hemodialysis patients with CRF [13] and to look for any relationships between CRF and biochemical [14].

METHODS AND MATERIALS

Patients

All patients in the current study had previously been diagnosed with renal failure and were undergoing regular dialysis., and samples were obtained with the help of doctors supervising the dialysis facilities (Specialized Center for Kidney Diseases and Transplantation, Sadr Medical City, Najaf Governorate) between (March 2022 to January 2022). The current study included 69 volunteers, 39 patients, and 30 control as a healthy group. Age of the participating patients was between 22–42, whose study was included. All patients and healthy people underwent the medical examinations included in the current study. In addition, the patients had all the clinical signs of renal failure, in addition to that all patients had undergone dialysis more than twice. Exclusion criteria included all patients with liver disease, malignant tumors, and patients with other autoimmune diseases including rheumatoid arthritis, diabetes, and SLE.

Materials

Specimens were taken from a vein for the volunteers for each patient and a healthy group. Examination of the evaluated markers CRP, uric acid, urea, creatinine, albumin, iron, hemoglobin, RBCs, and WBCs, in patients with CRF who underwent dialysis more than twice and had been diagnosed with CRF. Before the week's normal dialysis began, blood was obtained. By using a turbimetric immunoassay, CRP was quantified. and laboratory analyses of biochemical substances measured the concentrations of *S. albumin*, *S. creatinine*, and *S. urea* using an auto analyzer (Siemens dimension RXL).

Statistical Analysis

Data was statistically handled and analyzed with Microsoft (SPSS v. 26). Results were represented as Mean ± Standard Deviation. T. test was used to compare variables in both studied groups. Pearson's correlation was applied to determine the correlations among the measurable factors of the present study, significant was determined regression.

RESULTS

Current study design is case control that was applied to dialysis patients, biochemical parameters in patient group and control group as age, Blood Pressure, Body mass index (BMI). The references value of creatinine (0.5 mg/dL – 1.1 mg/dL), uric acid (2.4 mg/dL – 7.0 mg/dL) urea (10 mg/d – 50 mg/dL), albumin (3.4 g/d –5.4 g/dL). T-Test and Pearson correlation had been carried out for analysis BMI, sex, iron, RBC, and WBC patients with CRF. Patients and health analysis data are shown in Tables 1–3. The results will be obtained with significant differences for parameters the measurements were considered significant (p-value ≤ 0.05 or ≤ 0.01). Table 1 shows demography parameters (age, BMI, duration dialysis and smokers).

Table 2 shows biochemical variables of patients and healthy volunteers with had significantly greater level of CRP ($p < 0.001$), creatinine, hemoglobin, iron, RBC and WBC. High level of CRP The mean values of the patients were 20.340 ± 2.17 were indictor of the deterioration of the patients' condition is an indicator of a high probability of death if it is higher than 10.

It is a very dangerous indicator and a warning that the kidney replacement process will be accelerated. CRP and creatinine are necessary, extremely important markers of CRF, outcome of these factors'

association with elevated inflammation, addition to the concentration of albumin in dialysis patients decreased about the normal range because lose amount of protein in dialysis process, whereas uric acid 6.58 ± 3.39, and creatinine 854 ± 1.60 were elevated. But urea was not significant but it still higher than control healthy group.

Table 1. Demography parameters of studies group.

Parameters	Dialysis's patients n = 39 mean ± SD	Control n = 30 mean ± SD	P-value
Age/Y	38.09 ± 8.75	34.28 ± 6.30	N
Sex M/F	23/16	18/12	–
BMI	20.07 ± 5.10	26.08 ± 4.00	N
Duration of dialysis (M)	39 ± 26.17	–	–
Family history	14	–	
Smokers	145.17 ± 20.84	120.60 ± 10.94	0.001*
SBP (mm Hg)	82.83 ± 22.49	72.02 ± 10.50	0.001*
DBP (mm Hg)	132.80 ± 18. 09	125.49 ± 4.01	

More than ninety percent of the patients had hemoglobin readings below the lower limit of normal for healthy adults, with an average hemoglobin of 95.2 grams, whereas the normal range between (120-17 g/L), patient outcome of iron shown decrease but still in normal range (6.6–28.7 μmol/L). RBC decrease in dialysis patients compared with healthy persons shown low. White blood cells were rising in patients more than healthy group.

Table 2. Baseline charters of dialysis patients by comparing with healthy subjects.

Parameters	Dialysis patients mean ± SD	Control mean ± SD	p. value
CRP mg/L	20.340 ± 0.17	0.25 ± 0.21	<0.001
S.cr μmol/L	154 ± 1.60	58 ± 0.22	<0.001
S. urea (mmol/L)	32.7 ± 96.00	1.90 ± 0.24	<0.001
S. Uric acid (mg/dl)	6.58 ± 3.39	4.01 ± 0.84	<0.001
Albumin (g/dl)	0.7 ± 1.121	4.1 ± 0.14	0.002
Hemoglobin (g/L)	95.2 ± 6.8	136 ± 12.9	<0.001*
Iron μmol/L	11.3 ± 5.4	22.8 ± 3.78	<0.001*
RBCs	3.6 ± 0.7	5.7 ± 1.21	<0.001*
WBCs	10.2 ± 1.31	6.7 ± 2.24	<0.032*

Note: CRP: C-reactive protein, S.Cr: Serum Creatinine, RBC: Red blood cells, WBC: White blood cells,
SD: Standard deviation, **Correlation is significant at the <0.01 level, *Correlation is significant at the < 0.05 level.

Table 3 shows Pearson correlation between CRP and biochemical variable in our study linkage between CPR with another variables because base to other studies they provide high level of CRP. Additionally, the dialysis patients in this study showed higher levels of CRP (20.340 ± 0.17), CRP were positively significant correlation with uric acid (r = 0.501**, p = 0.005). Urea, significant had been shown higher in the dialysis patient than control. Dialysis patient out com showed decrease of albumin level compare with healthy contributed to currently study is shown in r = –0.249, p = 0.012. Hemoglobin Iron, red blood cell, and white blood cell are negative correlation with CRP.

Table 3. Pearson correlation between biochemical markers CRP with biochemical marker.

Parameters	Dialysis patients		Control	
	r	p	r	p
S.cr (μmol/L)	0.443*	0.014	0.051	0.617
S. urea (mmol/L)	0.138	0.468	0.113	0.262
S.u.a (mg/dl)	0.501**	0.005	0.182	0.070
Albumin (g/dl)	–0.249*	0.012	0.084	0.407
Hemoglobin (g/L)	–0.657**	0.000	0.097	0.336
Iron	–0.055	0.588	0.024	0.812
RBC	–00.084	0.407	0.136	0.179
WBC	0.376**	0.000	0.063	0.536

DISCUSSION

Patients undergoing permanent dialysis are more likely to die because they are more susceptible to cardiovascular diseases [15]. In addition to their increased risk of exposure to respiratory infections. Previous studies have shown an increased risk of respiratory infections in dialysis patients [16]. Our current study used the vital changes in the glands to monitor patients with renal insufficiency who are undergoing dialysis [17]. The concentration of C-RP was studied, which is an indicator of tissue damage and the extent of the deterioration of the patients' condition [18]. Measuring CRP is one of the necessary measurements to monitor the rate of development and deterioration of the disease. elevated levels of CRP are an indicator of an increased level of inflammation, as it is one of the acute phase proteins [19]. According to reports, hypoalbuminaemia in chronic dialysis patients is a major predictor of death, especially cardiovascular death [20]. Hypoalbuminemia has a variety of reasons [21], some of which include tissue injury and infections [22]. Research had indicated that when dialysis patients consume within the usual range of calories, their albumin production is normal [23]. Peritoneal dialysis has made the connection between albumin loss and hypoalbuminemia in ESRD widely known [24]. Trans peritoneal albumin losses in patients receiving continuous ambulatory peritoneal dialysis (CAPD) ranged from 2.7 to 6.6 g on average per day, according to many clinical investigations [25]. Table 3 shows strong negative correlation between CRP and albumin serum, and according to a previous study, individuals with Hemodialysis and Peritoneal dialysis who had blood albumin concentrations in the lowest quartiles had considerably poorer survival rates than patients whose concentrations were in the highest quartiles [26]. Elevated creatinine in blood and urine is one indicator of renal impairment [27]. Dialysis's Impact on Serum Creatinine Level.

Patients with CRD receiving dialysis had serum creatinine levels up to 154 ± 1.60 μmol/L above normal range [28]. Most individuals had a serum creatinine level of 61.9 to 114.9 μmol/L [29]. In patients with chronic renal disease, the urea level is high before dialysis but decreases significantly after dialysis [30]. The results were in line with previous studies that showed elevated levels of CRP and uric acid in CRD [31]. The researchers say these findings are in line with previous studies, an increase in CRF disease-related uric acid and CRP levels [32] whose production rises with aging in reaction to endothelial cell inflammation or the presence of a foreign body. Curiously, several studies acknowledge that CRP and uric acid are inflammatory biomarkers. Elevated levels of CRP are indicators to increase the risk factor of CVD in CRD Patients [15]. Necessary note that chronic renal disease is a permanent inflammatory. It has recently been proposed that elevated uric acid is a sign of a higher risk factor for the pathophysiology of CRF [33]. In our study clinical parameters patients with CRF, are a difference. The levels of creatinine were higher in patients with CRF compared with control healthy group [30]. Anemia is one of the prominent indicators in patients with kidney failure because of damage to renal tissue [34]. Each Hemoglobin, iron red blood cell absolved were decrease than the normal range 110–120 g/L (Table 2). Due to damage to the renal tissue, anemia is one of the main signs in individuals with renal failure. In the present study the relationship between hemoglobin, Iron and red concentration with CRP were negative correlation. Because their kidneys are not producing enough of a hormone called erythropoietin to aid in the production of red blood cells, most dialysis patients suffer from anemia. Blood tests and hemodialysis frequently cause some blood loss. and resulting in low iron levels. According to a survey conducted in the United States, most people with CRF experienced anemia [35]. It was also noted throughout the study that individuals between the ages of 40 and 60 are more likely to experience CRF. The cause might be connected to hypertension or other aging-related changes [36]. During dialysis, patients' hemoglobin levels drop to a dangerous level, which is responsible for anemia. An increase in inflammatory rates was also observed. Future studies must be expanded to focus on the rise in inflammatory indicators [37–39] and the lifestyle that the patient followed before reaching the dialysis stages [40, 36]. Conduct a study and follow-up through medical history.

CONCLUSION

The current study has shown demonstrating that elevated CRP levels are a reliable indicator of damage in patients on chronic dialysis, addition to CRP responds to tissue damage quickly, making it a more sensitive measure than serum albumin. Creatinine, uric acid, and urea in the serum can cause a

number of problems in patients. There was a drop in serum albumin. Anemia in dialysis patients has a multifaceted, intricate etiology. Even though the damaged kidney's inability to produce erythropoietin is the main cause of anemia development. Other elements include inadequate protein synthesis, low iron levels, and hemodialysis dosage administered.

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