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Assessment of blood serum renalase in end stage kidney failure patient in Babylon city

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Abstract---End-stage renal disease is associated with significant changes in cardiovascular function, fluid, electrolyte, acid-base balance homeostasis, bone metabolism, erythropoiesis, and blood coagulation. Between October and the end of December 2021, the study recruited (30) patients and (20) healthy control subjects. Several physiological parameters, such as (urea, creatinine, renalase, and glomerular filtration rate). The results of the current study showed that the patient groups have significant statistical significance ($P \leq 0.05$) levels of RNLS, Urea, GFR, and creatinine in contrast with control groups, resulting insignificantly differences ($P \leq 0.05$).

Keywords---end-stage renal disease, renalase enzyme, urea, glomerular filtration rate.

Introduction

End-stage renal disease (ESRD) affects the cardiovascular function system, bodily fluid, electrolyte, and acid-base balance affecting bone metabolism, erythropoiesis, and blood coagulation. As ESRD becomes more common, the number of people who require surgery under general anesthesia is rising worldwide. Because of their many comorbidities, patients with ESRD have more significant perioperative morbidity and mortality risks(1).The glomerular filtration rate (GFR) can be defined as a measurement of how much plasma flows from the glomerulus into Bowman's space in a specific amount of time. According to GFR and the presence of indicators of kidney injury, CKF has been categorized into 5 phases by international consensus. The kidneys received about (20% -25%) of the heart's output (approximately 1.0 to 1.1 liters/minute(2).

Urea is a slight chemical generated in the liver from proteins you have been eating. The kidneys typically excrete it. Consequently, blood levels rise as renal function declines. However, several factors affect the amount of urea in your blood stream. Therefore, it's not a straightforward kidney function to conduct. Here are a few of them: Blood loss into the intestines, such as a bleeding lesion, raises urea levels. If you need a solution (for example, if you consume very little water), your kidneys will retain more urea in the blood. How much protein have you consumed? A high protein intake elevates urea levels. Although liver disease urea production, urea remains a very useful check when combined with creatinine. It can also be used to live, independent of how well dialysis is working to remove waste products (3). Renalase is a Flavin adenine dinucleotide-dependent amine oxidase that metabolizes catecholamines and may be a therapeutic target for sympathetic nervous system overstimulation (4). The estimated glomerular filtration rate and circulating renalase levels were adversely linked (eGFR). Because it has strong hemodynamic effects, it's expected to have a role in cardiovascular function regulation. Hypertension and CV problems in CKD are caused by renalase insufficiency (5).

Aim of the study

The goal of the current study is to determine the concentration of renalase in serum using an ELISA kit (enzyme-linked immunosorbent test) made up of commercially available FAD-dependent amine oxidase and estimate several kidney function tests such as (urea, creatinine, and glomerular filtration rate).

Materials and Methodology

All chemicals were supplied from BDH, HI Thirty specimens of blood were taken from patients with end-stage renal disease who went to the Dialysis center at Imam Sadiq Hospital in Babylon, Iraq, and twenty specimens were taken as a control. For each patient, blood samples were taken in a gel tube (3ml) and centrifuged at speed (3500xg for 10 minutes to get the serum. The serum was put in Eppendorf tubes and stored in the freezer (-25°C) until the required tests were performed. Renalase concentrations were measured by a commercially ELISA kit (Wuhan, China). A commercially available kit was used to measure urea and creatinine (Linear Company Spain).

Statistical Analysis

The statistical package for social science (SPSS) version 23 software was applied to data analysis. The normality test was tested using an independent t-test. of the distribution. ($P \leq 0.05$ = significant), ($P > 0.05$ non-significant) is the probability.

Result

The levels of demographic data of the subjects involved in the study are shown in Table 1

Table 1
The demographics of the study participants(mean±SE)

	Patients	control
Number of subjects	30	20
Male	15	15
Female	15	5
Age (years; mean±SE)	59.9±0.58	57.8±0.56
Range of age (years)	58-62	56-60

*P<0.05.S.E: Standard error

Table 2
Patients and control groups Renalase enzyme, urea and creatinine were measured together with the Glomerular Filtration

Groups Parameter	Patients Mean± S.E	Control Mean±S.E	P-value
RNLS (ng/ml)	7.71± 0.55	9.46 ±1.12	0.130
GFR (mL/min)	8.87±0.38	101.37±12.02	0.001
Urea (mmol/l)	16.89±0.80	4.45±0.18	0.001
Creatinine (µmol/l)	32.64±505.40	3.87±93.1	0.001

In our investigation, fifty subjects were recruited, and their demographic information is detailed in Table 1. 60% were male, and 40% were female in both the patient and the control groups. The mean age in the first group was 59.9±0.58years, while it was 57.8±0.56years in the control group. The data revealed that the patient groups had more significant differences (P <0.05) in Urea, Creatinine, and GFR levels, whereas there was a drop in the amount of RNLS, as shown in table 2. Chronic kidney disease rate increases with age and increased levels of CKD can develop in the elderly due to age-related renal function decline (6). The findings show a significant increase in older CKD patients. A rapid decline in glomerular filtration rate (GFR) with age raises the risk of end-stage renal disease. Moreover, a low GFR raises the risk of death and cardiovascular disease(7).

Discussion

In this study, The mean age of patients (66.30±1.05) years and the mean age of the control group (44.30±2.04) years. These results are consistent with the results by (Eoin,et al,2017).Table (2) shows that in individuals with ESRD, blood urea and creatinine levels are significantly higher than in healthy controls (P <0.05). Creatinine is a tiny, consumable substance whose production varies very little from day to day due to the metabolism of muscle creatinine. Creatinine is frequently buried in the proximal tubule along the macrobiotic cation pathway from side to side. GFR capacity is muddled by the hidden creatinine component, which varies from person to person over time. Renalase levels are much lower in patients with chronic kidney disease (CKD), which correlates with higher levels of endothelin, a hormone linked to the etiology of cardiovascular disease(8).

Because the levels of RNLS in patients with ESRD were found to be statistically lower than those in the control group in this study, numerous studies have found that renalase levels in patients with CKD and ESRD were reduced, implying that lower serum renalase levels and increased catecholamine levels are linked. According to Xu et al, patients with the end-stage renal disease showed lower renalase plasma levels than healthy people(9). High catecholamine levels in CKD worsen renalase deficiency, leading to hypertension and cardiovascular disease, according to Desir et al (10). According to a previous study, Renalase concentrations are substantially greater in dialysis patients (CKD), and this change is linked to the severity of the disease (11). Lower renalase levels in ESRD patient serum may be due to decreased renalase synthesis by these patients' kidneys. However, the function and properties of renalase are still unknown, and further research is required(8).

Conclusion

This study revealed that RNLS levels are lower in hemodialysis patients with ESRD. Confirmatory studies are needed to analyze the stages of RNLS in patients in the early stages of kidney failure in order to describe the significance of this enzyme level in CKD.

Ethical issues

Ethical issues The research followed the tenets of the Declaration of Helsinki. The study was also approved by the ethics committee of KufaUniversity of Sciences (#T/6203 in 25-10-2021). ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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