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Original Research Paper

Evaluation Of The Serum Level Of Vimentin In Chronic Kidney Disease Patients In AL-Najaf Province/Iraq

Rusul Nazar Shaker[1]
Mohammed Abdulrazzaq Assi [2]

[1]*Department of Medical Laboratory Techniques, College of Health and Medical Techniques/ Kufa, Al_Furat Al_Awsat Technical University, 31003 Al-Kufa, Iraq*
[2]*Department of Anesthesia Techniques, College of Health and Medical Techniques/ Baghdad, Middle Technical University, Iraq.*

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*Corresponding Author: **Rusul Nazar Shaker**
E. mail:
kuh.muh@atu.edu.iq

Abstract: *Chronic Kidney Disease (CKD) is a complex condition characterized by kidney damage or decreased function, leading to a range of complications. These include cardiovascular risk, immune dysfunction, and lung disease. The study aims to investigate the association of Vimentin and other biochemicals in patients suffering from CKD and the possibility of using it as diagnostic criteria for CKD. The current investigation comprised a cohort of 96 patients diagnosed with CKD and a control group of 88 healthy participants.Vimentin and other biochemical levels were estimated in the serum of patients and the control group. The results showed that patients with CKD significantly increased ($p<0.05$) in Vimentin serum concentrations compared to healthy participants. These findings support the evidence suggesting that Vimentin may play an essential role in the progression of CKD.*

Keywords: *CKD, Vimentin, Biochemical Parameters, Diagnostic criteria, Urea*

1. Introduction

Chronic kidney disease (CKD) is a significant and growing global health concern, characterized by the gradual loss of kidney function over time[1]. It is commonly associated with diabetes, hypertension, and cardiovascular disease, and can lead to end-stage renal disease (ESRD) and increased mortality[2]. After the occurrence of renal injury, a progressive deterioration in renal function is observed, resulting in the development of chronic end-stage renal failure [3]. CKD progression is marked by kidney damage, scarring, tubular cell death, tissue scarring, and blood vessel abnormalities. The management of CKD requires attention to nutritional therapy. CKD is a global problem with a growing number of cases. Despite the difficulties, proper care can improve the quality of life for elderly CKD patients [4].

Vimentin, a protein, has been the subject of extensive investigation concerning various aspects of kidney disease. In the context of metastatic renal cell carcinoma (mRCC), the presence of elevated levels of Vimentin has been linked to not only a decrease in overall survival but also immunosuppression within the tumor microenvironment [5]. In clear cell renal cell carcinoma (RCC), Vimentin has been identified as playing a pivotal role in the formation of vasculogenic mimicry (VM) structures induced by hypoxia, and its overexpression has been directly correlated with an unfavorable prognosis [6]. When examining the setting of acute kidney injury (AKI) and renal tubular regeneration

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(RTR), it has been discovered that the heightened presence of Vimentin is associated with degenerative changes occurring within the renal tubules, thus suggesting its potential utility as an immunohistochemical marker for RTR following AKI [7]. Furthermore, in patients who have reached end-stage renal disease (ESRD), a degradation of Vimentin in lymphocytes has been observed, although no definitive correlation with apoptosis has been established [8].

This study aims to evaluate changes in the serum concentration of Vimentin and other biochemical substances in individuals with chronic kidney disease. Furthermore, this investigation seeks to assess the potential prognostic significance of these biomarkers in the early identification of CKD

2. Methodology

Subjects

The study is carried out from August to December 2023 in the Kidney Disease Center of the Al-Sader Teaching Hospital in Najaf, Iraq. This investigation included ninety-six patients (48 males and 48 females). They were between thirty and seventy years old. Based on the radiological study, family history, and clinical symptoms, they were diagnosed by nephrology specialists. Laboratory analysis of albumin, urea, and verified creatinine. This study included all inpatients with clinical and/or biochemical signs of chronic kidney disease. Baseline data, such as age, sex, medical history, length of disease, and family history, was collected for each patient at the first visit. Prior to the sample, each patient provides verbal consent.

Control

The patients and controls (N:176) were matched for age and sex and consisted of eighty healthy individuals as the control group. This control group was studied using enzyme-linked immunosorbent assay (ELISA). Every member of the control groups was asked to fill out a questionnaire and did not have any family history of illness.

Statistical analysis

The study used the statistical package for social sciences (SPSS, version 23) for statistical analyses. For comparisons between groups, the independent t-test and standard deviation were used. All statistical tests were considered significant at a level less than <(0.05).

3. Results and discussion

Based on Table (3.1), The statistical analysis indicated a highly significant ($p = 0.0001$) increased mean of glucose (193.75±74.82) mg/dl, urea (163.22±28.80) mg/dl, creatinine (9.26±3.74) mg/dl, and vimentin (11.77±5.78) ng/ml in patients as compared with controls (98.13±14.59) mg/dl, (21.21±5.68) mg/dl, (0.66±0.22) mg/dl, and (7.31±1.79) ng/ml, respectively. On the other side, patients had lower mean albumin (3.43±0.40) g/dl, and eGFR (33.80±25.70) mlmin1.73m2, compared to controls (4.35±0.73) g/dl, and (129.16±53.98) mlmin1.73m2, respectively.

Significant differences in the number of biomarkers related to renal function were found in the investigation. Compared to controls, CKD patients had noticeably higher levels of glucose, urea, creatinine, and Vimentin, which suggested compromised renal function and perhaps increased systemic Inflammation and fibrosis—further highlighting the association between elevated glucose levels and renal dysfunction, suggesting a link between glucose tolerance status and CKD risk [9]. Additionally, the adverse clinical outcomes associated with an elevated urea-to-creatinine ratio in CKD patients were emphasized by 9, which supports our results. The association between hyperuricemia and CKD emphasizes its role in Inflammation and fibrosis, which aligns with our findings of elevated urea and creatinine levels indicative of impaired renal function [10]—studied the clinical significance of saliva urea and creatinine levels in CKD patients, proposing a noninvasive method for diagnosing kidney disease [11]. Investigated serum biochemical derangements and associated risk factors in 612 confirmed chronic kidney disease (CKD) patients in Pakistan. Elevated creatinine and urea levels were found in all patients, with hyperuricemia present in 63.4% [12]. proposed urinary vimentin mRNA as a potential biomarker for renal fibrosis, which resonates with our observation of elevated vimentin levels in CKD patients, indicating potential fibrotic processes [13].

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Conversely, CKD patients demonstrated lower levels of albumin and eGFR, further corroborating compromised renal function and impaired glomerular filtration rate in this population. [14] demonstrated in elders that lower serum albumin levels were strongly associated with kidney function decline, independent of urine albumin and inflammatory markers.

Table 3.1: Comparison of Demographic and clinical characteristics of chronic kidney disease (CKD) patients and the control groups.

Variables		Mean	SD	Median	IQR	p-value
Glucose (mg/dl)	Patients	193.75	74.82	190.05	124.13-271.25	0.0001*
	Control	98.13	14.59	93.40	87.00-112.98	
Urea (mg/dl)	Patients	163.22	28.80	162.58	140.01-180.03	0.0001*
	Control	21.21	5.68	20.57	16.34-26.86	
Creatinine (mg/dl)	Patients	9.26	3.74	8.43	6.16-11.87	0.0001*
	Control	0.66	0.22	0.65	0.47-0.82	
Albumin (g/dl)	Patients	3.43	0.40	3.40	3.18-3.82	0.0001*
	Control	4.35	0.73	4.35	3.87-4.83	
eGFR (ml/min/1.73m2)	Patients	33.80	25.70	20.15	11.88-64.85	0.0001*
	Control	129.16	53.98	113.60	97.55-162.38	
Vimentin (ng/ml)	Patients	11.77	5.78	9.29	7.59-14.41	0.0001*
	Control	7.31	1.79	7.31	5.73-8.06	

Conclusion

Our findings highlight the multifactorial nature of CKD pathology, emphasizing the importance of considering a panel of biomarkers to comprehensively assess renal function and disease progression. Notably, Vimentin emerged as a promising biomarker, demonstrating a significant association with macroalbuminuria in CKD patients. To gain further details and validate the significance of these criteria when coupled with other CKD Biomarkers, further investigation with an extensive group needs to carry out.

Ethical approval

The agreement of the irrigation for minors and the patients' approval for adult patients were obtained by the study's specimens in accordance with ethical guidelines, legal requirements, and human rights organizations' directives.

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