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ORIGINAL ARTICLE

Clinical Correlates of Soluble sCD163 and IL9 in Patients with Chronic Kidney Disease and Lupus Nephritis

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ABSTRACT

Background: *Chronic kidney disease is a progressive condition characterized by the gradual deterioration of renal function, leading to the accumulation of waste products in the body. This condition affects over 800 million individuals globally with a disproportionate burden on older adults, women, racial minorities, and individuals with diabetes mellitus or hypertension.* ***Objective:*** *the aim of this works is to study the immunological role of cluster of differentiation163 and interleukin9 in patients with chronic kidney disease and lupus nephritis.* ***Methodology:*** *From 1st August 2023 until the end of January 2024, 40 healthy participants and 80 patients with chronic kidney disease and lupus nephritis were enrolled in this study at AL-Najaf Hospital. The ELISA test was used to test sCD163 and IL9 in each patients' blood.* ***Results:*** *Patients' serum levels of IL9 and sCD163 were substantially higher ($P<0.05$) than those of control participants. There was no appreciable variations in sCD163 and IL9 between cases with lupus nephritis and those with chronic renal disease.* ***Conclusion:*** *Our results proved that there was an important immunological role of sCD163 and IL9 in patients with chronic kidney disease and lupus nephritis.*

INTRODUCTION

Kidney disease is an urgent and critical public health concern impacting millions of people worldwide[1]. Despite its wide-ranging consequences kidney disease often receives less attention and resources compared to other non-communicable diseases[2]. However, the detrimental effects of kidney disease on individuals and communities cannot be ignored[3]. Efforts to raise awareness, improve prevention strategies and enhance access to quality care for kidney disease are crucial to address this pressing global health challenge[4,5].

It disproportionately impacts rural agricultural communities in hot-regions of Central America and Asia, where it has been classified as chronic kidney disease of unknown etiology[6,7].

This disease often presents with childhood-onset and repeated acute kidney injury, highlighting the need for early-stage markers of kidney damage and dysfunction[8]. Healthcare professionals and researchers need to work together to understand better and address this epidemic as it poses significant health risks and challenges in affected communities[9]. The interaction between the lung and kidney is crucial for maintaining homeostasis and normal bodily functions[10]. To understand the impact and interplay of lupus nephritis on both kidney and lung function, it is important to consider the systemic nature of the disease and the potential complications that can arise. Additionally, lupus nephritis presents a major challenge in terms of treatment and management, as currently available therapies still have limitations in preventing progression to end-stage[11].

One well-known side effect of the autoimmune disease systemic lupus erythematosus is lupus nephritis[12]. This immune response is characterized by the production of autoantibodies, such as anti-double-stranded DNA (dsDNA) and anti-Smith antibodies[13]. These autoantibodies form immune complexes that deposit in the kidneys, activating the complement cascade and triggering an inflammatory response.

METHODOLOGY

Patients

A total of 120 individual with age range (18-60) years were enrolled in this study carried out in the Department of Nephrology at AL-Najaf Hospital in Al-Najaf City, Iraq from 1st August 2023 to the end January 2024. Patients were divided into the followings: 40 individuals infected with CKD, 40 individuals infected with CKD and LN, 40 healthy were included in this study as control; all healthy individuals have a negative history and clinical evidence of any other disease. All CKD and LN- patients have been diagnosed by physicians.

Measurement of serum levels of SCD163 and IL9

It was carried out in accordance with the manufacturer's instructions. Five milliliters of blood were taken from each subject, and sera were recovered by centrifugation at 8000 rpm/10 minutes[14,15] then

stored at -70 C until used. This blood concentration was used to test sCD163 and IL9 using the enzyme-linked-immunosorbent assay as follow[16.17]; after the determination of diluted standard, blank, and sample wells, the 100µL from each dilution of standard, blank and sample were added and the micro-ELISA plate was covered by the sealer and incubated for 90 min at 37 ºC. After incubation, all liquid was removed from each well, 100µL of Bio-tinylated detection antibody solution were added to each well, and the micro-plate was covered with a new sealer and incubated for 1 hour at 37ºC . After incubation, all liquid were removed from each well and washed by adding 350 µL of washing buffer to each well (these steps were repeated three times). 100 µL of HRP Conjugate working solution were added to each well, covered by a micro-plate and incubated at 37ºC for 30min.The solution was removed from each well, and the washing step was repeated five times. Then 90 µL of substrate reagent were added to each well, and the micro-plate were covered by micro-plate sealer and incubated for 15 min. at 37ºC.Then 50 µL of stop solution were added to each well, and determination of the optical density (OD value) was done by ELISA reader at 450nm wavelength, then the results were calculated by plotting the standard curve.

Statistical analysis

It was performed using computer software (graph pad prism version 6), and a mean value and standard error (SE) were calculated for each value. The statistical analysis took into account statistically significant P values of less than 0.05[18,19].

RESULTS

sCD163

The serum levels of sCD163 in CKD-patients were (15653±166.7 pg/ml) compared with control (4288 ± 208.0 pg/ml) (Figure 1).The results elevated with a higher serum levels in CKD-LN-patients (16197 ± 168.3 pg/ml) with healthy individuals with significant increase (*P* value <0.0001) (Figure 2). While, there was no significant differences (P value 0.95450) in SCD163 serum levels between CKD-patients and CKD-LN-patients (Table 1).

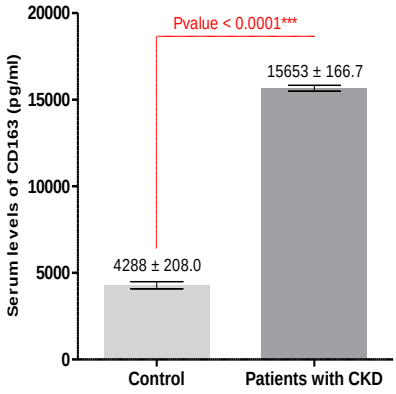

Fig.1. Serum-levels of sCD163 in healthy individuals and CKD-patients

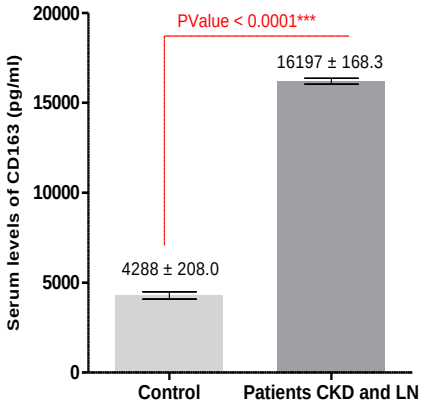

Fig.2. Serum-levels of sCD163 in healthy individuals and CKD-LN-patients

Table 1: CD163 levels in CKD-patients and CKD-LN-patients

Serum levels of sCD163 (pg/ml)		*P*-value
CKD-patients	CKD-LN-patients	0.9545
15653 ± 166.7	16197 ± 168.3	Non-significant

IL9

The serum levels of IL9 in CKD-patients were (7.496± 0.290 pg/ml) compared with healthy individuals (0.5093 ± 0.023 pg/ml) (Figure 1). Also, there was a higher serum levels in CKD-LN-patients (3.208 ±0.110 pg/ml) as compared with control with significant-increase (Figure 4). On the other hand, a significant increase in IL9 serum levels of CKD-individuals was higher than in CKD-LN-patients (Table 2).

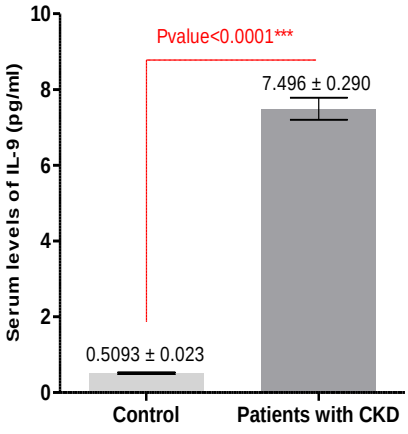

Fig.3. Serum-levels of IL9 in healthy individuals and CKD-patients

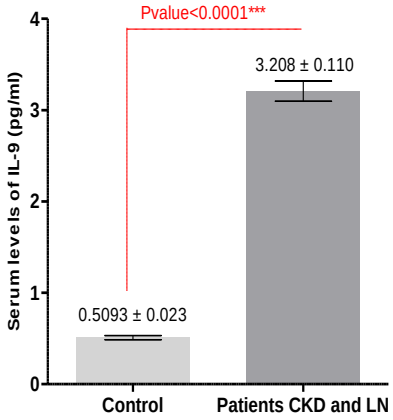

Fig.4. Serum-levels of IL9 in healthy individuals and CKD-LN-patients

Table 2: IL9 serum levels of cases infected with chronic-kidney disease and chronic kidney disease with lupus nephritis

Serum levels of IL9 (pg/ml)		P-value
Patients with CKD	Patients with LN and CKD	< 0.0001*** Significant
7.496 ± 0.2902	3.208 ± 0.1108	

DISCUSSION

The immune response plays a crucial role in kidney diseases, particularly in conditions such as Systemic Lupus Erythematosus and glomerulonephritis[20]. In these conditions, the immune system mistakenly attacks the kidneys, leading to inflammation and damage[21].

SCD163 has been associated with kidney diseases particularly chronic kidney diseases. PK-15 SCD163 cells, which are pig kidney cells expressing the SCD163 receptor[22,23]. This suggests that sCD163 could potentially marker for chronic kidney disease, allowing for early detection and monitoring of the disease[24,25].

IL9 has been implicated in kidney disease, including lupus nephritis to the development and progression of kidney disease, particularly lupus nephritis[26].

Another important aspect in the immune response of lupus nephritis is the role of IL-10. It is an important immunoregulatory cytokine, has been found impact on the development kidney damage in lupus nephritis[27].

The immune response in lupus nephritis leads to kidney damage. The production of proinflammatory cytokines and chemokines, along with an increase in leukocytes, intensifies interstitial nephritis and promotes fibrosis in the kidneys[28].

These inflammatory processes in lupus nephritis. Formation of immune complexes, release of pro-inflammatory cytokines, chemokines and infiltration of leukocytes[29,30].

CONCLUSION

In patients, IL9 and sCD163 are significantly-high (P=0.05) compared to controls. Individuals with chronic kidney disease and patients with chronic kidney disease and lupus nephritis did not have significant differences in serum levels of sCD163 and IL9. The immune markers sCD163 and IL9 can be used to diagnose chronic kidney disease and lupus nephritis.

Declarations:
Consent for publication: Not applicable
Availability of data and material: Data are available upon request.
Competing interests: The author(s) declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.
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