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Investigation of Some Clinical Parameters in Renal Failure Patients

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Abstract:

Kidney failure is a disease that affects the entire body and often leads to death. Samples were collected from Al-Sadr Teaching Hospital, Kidney Unit, from patients with renal failure for the period from 1/1/2024 to 1/6/2024. The number of samples was 28. Also, 28 people were collected from a control group. The samples were examined in the laboratories of the College of Science, University of Kufa. Consent was obtained from the patients according to the agreement between the University of Kufa and Al-Sadr Teaching Hospital. The average age of the patients was (45.24±1.3) while the age of the control group was (38.31±2.4). The result shows a significant increase in creatinine, urea, and total CO2 in people with renal failure compared to the control group (mean ± standard error). The results also showed a significant decrease in eGFR and vitamin D3. The study concluded that kidney dysfunction first affects the functions of other cells and causes other parameters to lose their functions, ultimately leading to death.

Keywords: Kidney failure, creatinine, urea, total co2 and vitamin D3

INTRODUCTION

The study of vitamin D3 and its levels in patients with renal failure is important in a very important research field (1,2). Vitamin D3 affects patients with chronic kidney disease and also affects the metabolism process (3.4). The role of kidneys is one of the most important organs that convert vitamin D to its active form, citriol (1,25-dihydroxyvitamin D3), through enzymatic hydroxylation (5,6). Kidney failure leads to a defect in the conversion of vitamin D to its active form, which reduces vitamin D3 levels in the body (7,8). Vitamin D3 deficiency is widely prevalent in patients with chronic kidney failure, especially in advanced stages, due to decreased kidney function and decreased activity of the enzyme required to activate vitamin D3 (9,10). Vitamin D3 plays a crucial role in calcium and phosphate metabolism. Low levels of vitamin D3 can contribute to renal osteodysplasia, a common bone disorder in patients with chronic kidney failure, characterized by bone pain, fractures, and skeletal deformities (11,12). Low levels of vitamin D The parathyroid glands may increase the secretion of parathyroid hormone to compensate for low calcium levels, leading to secondary hyperparathyroidism, a common condition in kidney failure that further impacts bone health (13). Low vitamin D levels can induce an imbalance between calcium and phosphate, which can calcify blood vessels and raise the risk of cardiovascular disease, which is the main cause of morbidity and death in people with chronic renal failure (14). Vitamin D has immunomodulatory properties. Vitamin D3 deficiency can impair

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immune function, making patients more susceptible to infections and possibly affecting levels of inflammation (15). Regular monitoring helps assess mineral balance and the risk of complications, such as cardiovascular problems (16). This study aimed to investigate vitamin D deficiency and other clinical parameters and its effect on renal failure.

MATERIALS AND METHODS

Samples were collected from Al-Sadr Teaching Hospital, Kidney Unit, from patients with renal failure for the period from 1/1/2024 to 1/6/2024. The number of samples was 28. Also, 28 people were collected from a control group. The samples were examined in the laboratories of the College of Science, University of Kufa. Consent was obtained from the patients according to the agreement between the University of Kufa and Al-Sadr Teaching Hospital. The average age of the patients was (45.24±1.3) while the age of the control group was (38.31±2.4).

RESULTS

The result shows a significant increase in creatinine, urea, and total CO2 in people with renal failure compared to the control group (mean ± standard error). The results also showed a significant decrease in eGFR and vitamin D3.

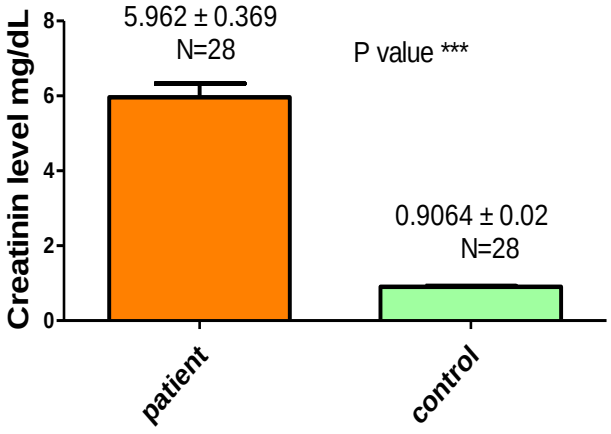

Figure (1) shows the creatinine level.

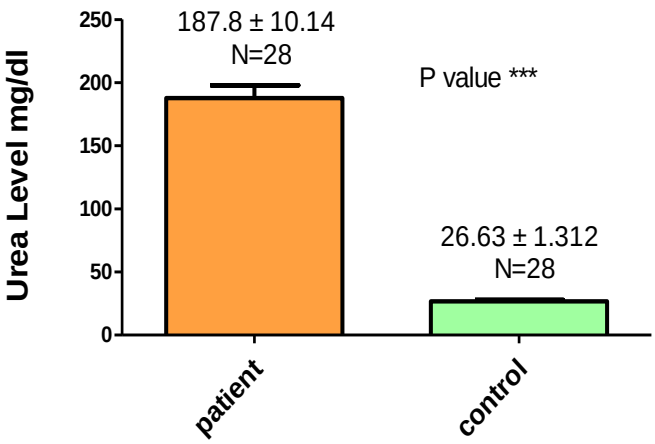

Figure (2) shows the Urea level.

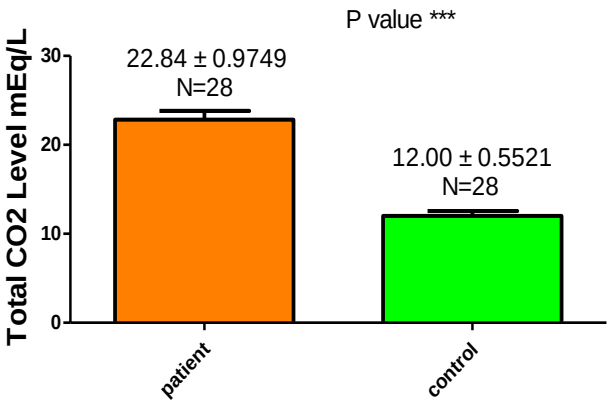

Figure (3) shows the total CO2 level.

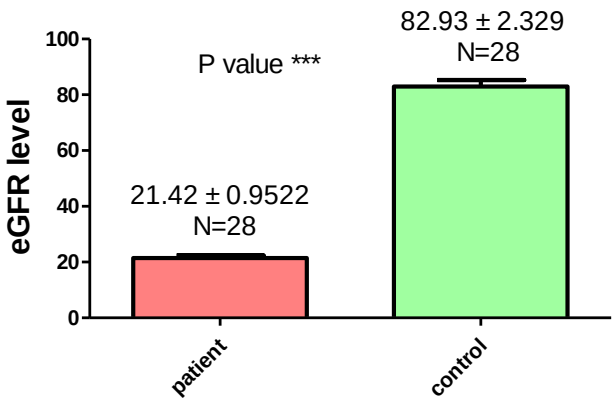

Figure (4) shows the eGFR.

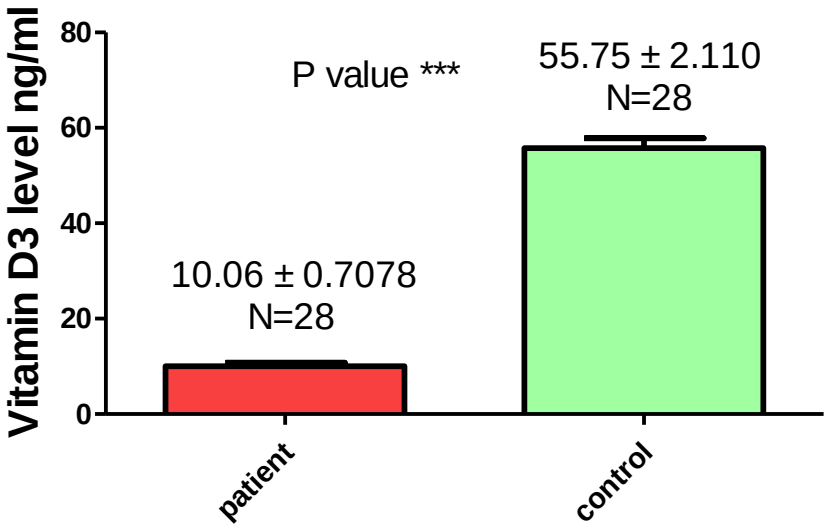

Figure (5) shows the Vitamin D3 level.

DISCUSSION

People with renal failure may have higher levels of creatinine, urea, and total carbon dioxide than control groups because their kidneys are less able to filter and eliminate waste products from metabolism (17,18). The kidneys typically filter a large amount of creatinine, which is a by-product of muscle metabolism, especially from the breakdown of creatine phosphate, and eliminate it in the urine (19,20). Decrease of eGFR in renal failure is usually decreased, meaning that the kidneys cannot filter the blood effectively. This leads to a buildup of creatinine in the blood, as it is no longer adequately excreted. Also, the kidney function indicator is high creatinine, which is a sign of kidney dysfunction (21,22). Since the breakdown of amino acids in the liver produces urea, which is typically eliminated by the kidneys, urea is regarded as a byproduct of protein metabolism. Urea accumulates in the blood (uremia) in individuals with renal failure due to decreased urea clearance, which raises blood urea nitrogen (BUN), another measure of kidney function (23,24).

Also, elevated total carbon dioxide (bicarbonate) is an acid-base imbalance in Kidney failure that impairs this ability, leading to a buildup of acids in the blood (metabolic acidosis). Increased compensatory bicarbonate Total carbon dioxide (TCO_2) in blood tests often represents bicarbonate levels. In the early stages of kidney dysfunction, the body may try to compensate for the acid buildup by increasing bicarbonate levels, which is reflected in a higher total carbon dioxide measurement (25,26). Inability to maintain acid-base balance in patients with advanced renal failure, bicarbonate levels may decrease as the kidneys lose their buffering capacity. Thus, total carbon dioxide may fluctuate depending on the stage of kidney disease and the body's compensatory mechanisms (27).

The kidney's function in activating vitamin D may be the reason for the findings, which indicated a drop in vitamin D3 levels in patients with renal failure (28). The metabolism of vitamin D Cholecalciferol, or vitamin D3, is first acquired from food or sun exposure. The liver initially transforms it into 25-hydroxyvitamin D, which is then transformed into calcitriol (1,25-dihydroxyvitamin D), which is its active form (29,30). In renal failure, the damaged kidney loses its capacity to activate. The enzyme 1-alpha hydroxylase, which is essential for converting 25-hydroxyvitamin D to active calcitriol, may be lost

by the kidneys. As a result, even with sufficient vitamin D consumption, levels of active vitamin D fall, resulting in insufficiency (31). Mineral imbalance may result from low vitamin D3 in renal failure: Calcium and phosphorus control depends on vitamin D3. When it is lacking, the intestines absorb less calcium, which triggers the secretion of parathyroid hormone (PTH) and secondary hyperparathyroidism, which can weaken bones and result in renal osteopenia (32).

CONCLUSION

Kidney disease initially impairs other cell activities, which in turn causes other parameters to stop functioning, which finally results in death.

One of the main causes of morbidity and death for people with renal failure is cardiovascular disease, which is linked to low vitamin D3. immunological system weakness: Vitamin D3 is also involved in immunological function, and people with renal failure who are deficient in it may have a compromised immune response, which leaves them more vulnerable to infection.

Conflict of interest: NIL

Funding: NIL

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