



Diabetes And Chronic Renal Failure: A Relationship

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Abstract

Chronic renal failure is a severe clinical problem that has some significant socioeconomic impact worldwide and hemodialysis is an important way to maintain patients ' health state, but it seems difficult to get better in a short time. Chronic kidney disease (CKD) is featured by a progressive decline of kidney function and is mainly caused by chronic diseases such as diabetes mellitus and hypertension. CKD is a complex disease due to cardiovascular complications and high morbidity; however, there is no single treatment to improve kidney function in CKD patients. The aim of the study is to evaluate the relationship between chronic renal failure and diabetes, as intensive glucose control can slow the loss of glomerular filtration rate (GFR) and possibly progression to the end stage of the disease. The study will focus on finding the percentage of kidney failure in the community, its causes, clinical symptoms and treatment.

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1. Introduction

It is manifested in man's creation of balance in his various bodily systems, and the kidneys represent the most important pillars of this balance. Due to their effective role in ridding the body of various substances as the products of vital processes and other waste products, which must be excreted outside the body through urine, as well as their role in maintaining balance. water and acid-base balance of body fluids, In addition to its hormonal and metabolic functions [1]. The occurrence of any defect in the kidneys affects the performance of its functions, which leads to a defect in the internal environment of the body, thus disrupting the functions of the rest of the other organs of the body [2]. Chronic kidney disease (CKD) is defined as having kidney damage or an estimated glomerular filtration rate (eGFR) less than 60 mL/min/1.73 mL, and lasting for 3 months or longer, regardless of the cause [3]. It is a condition of progressive loss of kidney function that eventually leads to the need for renal replacement therapy (dialysis

or transplantation). Kidney damage refers to pathological abnormalities suggested by imaging studies or renal biopsy, abnormalities in urinary sediment, or increased rates of urinary albumin excretion. Diabetic kidney disease (DKD) is the most common cause of end-stage kidney disease (ESKD). People with diabetic kidney disease are not only at high risk of progressing to end-stage ESKD but also at have a concomitant greater increase in risk of CV morbidity and mortality. DKD does not occur in the absence of hyperglycemia and glucose control is the main determinant of the onset of nephropathy. Despite this, the role of improved glucose control in slowing the progression of DKD remains controversial, but evidence now indicates that intensive glucose control can slow the loss of glomerular filtration rate (GFR) and possibly progression to end-stage ESKD. In fact, there is now evidence from observational studies that good glucose control, at least in patients with type 1 diabetes (T1DM), is associated with improved kidney health even in advanced DKD [4]. Some of the best evidence to support the beneficial effects of strict glucose control on the kidneys in people with T1DM and advanced nephropathy came from studies involving patients who had both pancreatic and kidney transplants. An almost complete reversal of several structural parameters associated with classic diabetic nephropathy was observed in the original kidneys of these patients 10 years after normal glycemia.

2. Chronic Renal Failure

Chronic renal insufficiency is defined as a permanent and persistent deficiency and irreversible deterioration in kidney function that leads to a loss of its excretion, metabolic and hormonal activity [5]. It is also known as the destruction of the renal units (nephron), and a continuous decrease in the glomerular filtration rate, secretory capacity and reabsorption (Reabsorption), and this consequently leads to the occurrence of uremia syndrome [5].

It is a term given to the clinical symptoms that occur in the body as a result of a failure in the functions of the kidneys, while the researcher (Knochel) in 1981 described it as uremia (Urine in blood). That is, an increase in the level of urea in the blood, which includes the retention of other metabolites that are released in the normal state, but in the presence of renal insufficiency they accumulate. These waste products in the blood cause systemic toxicity [6] and this is reflected in the form of pathological signs and complications in all body systems, especially the cardiovascular system, the nervous system, the immune system and the constituent system. Hematopoietic system and endocrine gland system [7, 8].

3. Percentage of kidney failure in our society

The incidence of this disease in society is not small, and the incidence of it varies from place to place, the different causes leading to it. Nineveh Governorate, for example, there are about three million residents, and it is expected that about (300-400) new cases will occur annually, knowing that doctors estimate that there are about (30-40) cases of final renal insufficiency (not final) [9].

4. Cause Of Chronic Renal Failure

Any disease that damages a large part of the renal tissue can lead to chronic kidney failure [10].

The most important of these diseases are the following:

1. Glomerulonephritis (glomerulonephritis).
2. Chronic Pyelonephritis.
3. High blood pressure Hypertension.
4. Urinary tract obstruction, such as prostate enlargement, urinary tract stones, and others.
5. Diabetes Mellitus.
6. Collagen diseases and other immune diseases, including Disseminated Lupus Erythematosus, Nodosa Polyarteritis, Purpura Anaphylactoid or Henoch-Schoenlein Purpura and Nephritis of Infective Endocarditis [11].

7. Hereditary Nephritis [12], Regardless of aetiology, advanced CKD has been characterized and diagnosed by sclerotic destruction of nephrons and subsequently an increased decrease in filtration, secretory capacity and reabsorption of the kidneys. This reduced capacity eventually leads to Uremic Syndrome [5].

4. Clinical Symptoms

It includes all body systems, because the disorder is general and comprehensive, and the clinical picture varies to the extent that some doctors include blood urea testing within the routine examinations of patients. Among the common symptoms are weakness in strength and general deterioration in health. Some patients suffer from dehydration, while others appear in the face and lower extremities due to the lack or excess of water and salt in the body. The second case prevails in the last stages of the disease. [13]. The heart may enlarge and then be unable to perform its function, starting with a deficit in the left ventricle, followed by the right, and pericarditis appears [5]. Cardiovascular disease is one of the most important causes of death for patients on dialysis [6].

Blood pressure rises in (85%) of patients with renal insufficiency, either as a result of an increase in water and salt in the body or an increase in the secretion of Renin, the hormone that causes high blood pressure from the diseased kidney, or for both reasons [14]. Kidney failure patients suffer from anemia due to weakness Appetite and diet imposed by the doctor and easy bleeding from places Multiple of the body and malabsorption of the necessary nutrients that help form Red blood cells, such as iron and folic acid [5]. Decreased production of red blood cells due to decreased production of erythropoietin, the hormone that stimulates the formation of red blood cells, which is secreted from the kidneys [2]. For this reason, kidney failure causes anemia and is associated with a high risk of heart failure and death [15]. As for the white blood cells, Leukocytes, their number does not change. As for the platelets, their number decreases and their work slows down if the situation intensifies, leading to bleeding from multiple places, which is helped by a decrease in other clotting factors in the blood [8].

5. Stage of Chronic Renal Failure

The stages of chronic renal failure range from four overlapping stages [15] described by the researcher (Knochel).

First stage: Domination of Renal Reserve

At this stage, the effectiveness of the kidneys decreases by at least about 25%, and despite the decrease in the glomerular filtration rate, the patient does not show symptoms of Azotemia, which is known as the accumulation of nitrogenous compounds in the body. While the visual and organizational effectiveness of the college remains preserved, as the college adapts itself by increasing the effectiveness of the healthy renal units.

Second stage: Renal insufficiency

At this stage, the decrease in the effectiveness of the kidneys increases to about 75%, the urine concentration decreases, and a group of pathological symptoms begins to appear, such as renal anemia and the accumulation of nitrogenous compounds.

The third stage: Overt failure

This stage is characterized by the exacerbation of anemia and azotemia with the onset of symptoms of Acidemia, Hypocalcemia, Hyperphosphatemia and Hyperkalemia. Renal osteodystrophy symptoms also develop and this stage quickly moves to the last stage.

Fourth stage: Uremia

It is the final stage of chronic renal failure (ESRD), and at this stage the symptoms increase, exacerbate and extend their impact to most of the body's systems. Conservative treatment does not work at this stage,

so the patient resorts either to Renal replacement therapy with both types of dialysis: hemodialysis (HD) or Peritoneal dialysis (PD) or to (Renal transplantation) [14].

6. Bone Disease and Skeletal Complication in Chronic Renal Failure

Chronic kidney failure inevitably leads to bone disease (Figure 1) [16] as a result of low bone mineral density [17]. Osteoporosis diseases resulting from renal insufficiency occur associated with the reduction of the visceral tissue of the kidney, as the production of effective vitamin D 1, 25-dihydroxycholecalciferol (vitamin D), which helps in the absorption of calcium by the small intestine, whose life path is shown in Figure 2. It does not occur naturally, as there is an imbalance and disturbance in the metabolism of divalent ions, especially calcium and phosphate, hyperparathyroidism, aluminum accumulation in the body and acidosis.

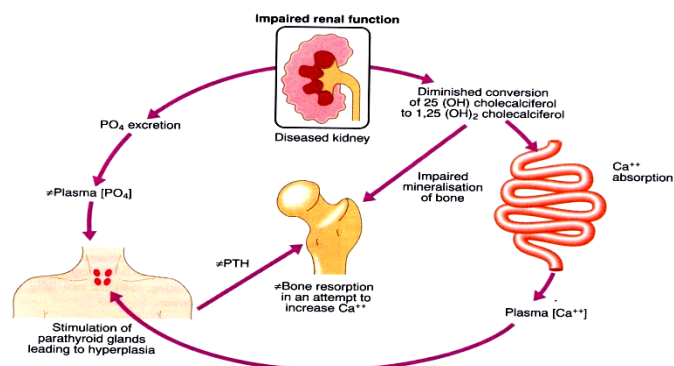


Figure 1. Shows the pathological causes of the emergence of osteoporosis and its pain resulting from renal insufficiency.

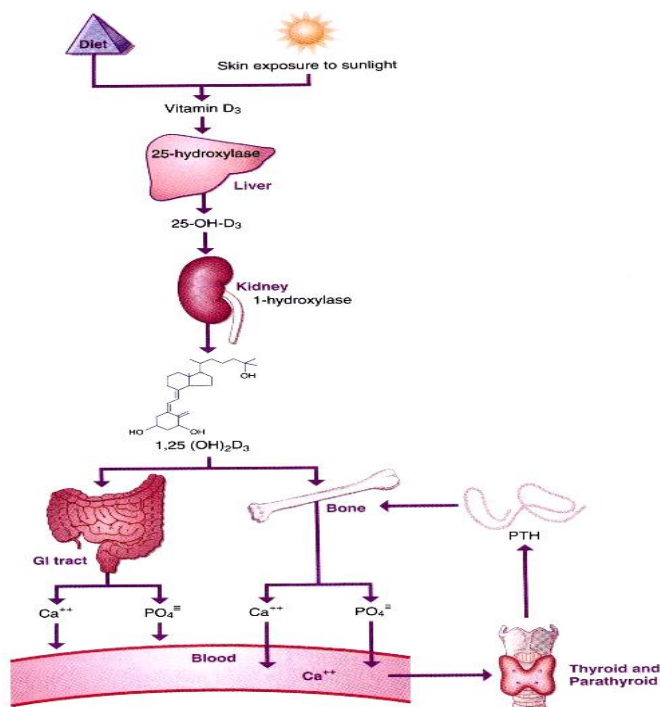


Figure 2. The life path of active vitamin D synthesis and its effect on target tissues

The bone diseases that appear in the case of chronic renal failure mainly include:

1. Osteomalacia: It is the deficiency of calcium in the bones, which leads to an increase in the amount of protein free of elements, especially calcium [11] and is caused by disturbance and lack of formation of the active form of vitamin D [10].
2. Osteitis fibrosa: This condition appears due to excessive secretion of parathyroid hormone [18].
3. Osteoporosis: It is characterized by a lack of bone mass, structural damage to the micro-tissue of the bone, and thus fragility of the bone and an increase in the rate of fracture [12].
4. Osteosclerosis: It occurs in certain areas of the skeleton, and its cause is unknown [5].

7. Results and Discussion

This research dealt with the problem of chronic renal failure patients, and this was link with the relationship of chronic renal failure with diabetes and the analysis of its causes with the disease. Patients with chronic renal failure were distribute spatially, and statistical tests were use to find the relationship between natural and human variables in the prevalence of chronic renal failure disease. The most important findings of the study can be summarize in the following points:

1. It became clear through the study that the percentage of final kidney failure, according to specialists' estimation, ranges here between 100 - 130. New cases per million of the population annually, in Nineveh Governorate, for example. There are about three million people in the population, and it is expected that about (300-400) new cases will occur annually, knowing that doctors estimate that for each case there is about (30-40) cases of (not final) renal insufficiency.
2. The study showed that blood pressure rises in (85%) of patients with renal insufficiency, either as a result of an increase in water and salt in the body or an increase in the secretion of Renin, a hormone that causes high blood pressure from a diseased kidney, or for both reasons.
3. It was found through the study decreased insulin degradation reduces the need to administer insulin to diabetic patients with advanced CRF or even prevents the need for it in patients with type 2 diabetes.
4. The study showed that in the advanced stages of CRF, when the glomerular filtration rate (GFR) becomes below 15-20 cc/min, the degradation and renal clearance of insulin decrease, which is clinically important in the treatment of patients with diabetes.
5. The study found that diabetes is a metabolic disease that causes renal failure, and renal failure increases the need for insulin in patients.
6. It turns out that 1.4% to 4.7% of middle-aged diabetics suffer each year from the occurrence of cardiovascular disease.
7. Treatment is renal replacement, hemodialysis, and peritoneal dialysis relatively solve this problem in most patients, and based on the amount of clinical improvement, insulin requirements change. The increased appetite and food intake resulting from the replacement therapy and the alleviation of symptoms of uremic accumulation also alter insulin requirements.
8. The study showed that CRF-induced anemia has an effect on insulin resistance, and correction of anemia by erythropoietin has been shown to increase insulin sensitivity in the body. Insulin secretion is also reduced in patients with CRF, which appears to be caused by metabolic acidosis, elevated parathyroid hormone levels, and low vitamin D levels.
9. Accumulation of uremic toxins and increased parathyroid hormone levels in patients with chronic renal failure to insulin resistance in tissues, especially skeletal muscle tissue. This is attributed to damage in the process of insulin binding to its receptors, which leads to disruption of glucose metabolism and glycogen production.

8. Conclusion

This study was conducted to determine the relationship between chronic renal failure and diabetes. According to the findings, when blood sugar levels in diabetics rise, the blood vessels (inside the nephron) and nerves are affected over time, in addition to the fact that filtering large amounts of glucose puts a strain on the kidneys, and after several years, useful protein begins to be excreted in the urine, and in severe cases, it can lead to kidney failure. The study showed that good glucose control, at least in patients with type 1 diabetes (T1DM), is associated with improved kidney health even in advanced DKD. In bone and associated with high risk of heart failure and death Chronic hyperglycemia in synergy with other metabolic abnormalities in diabetic patients can cause damage to various organ systems and the incidence of this disease in the community is not low and the incidence varies from place to place for reasons various leads to it.

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