



Received: 06-09-2023  
Accepted: 16-10-2023

ISSN: 2583-049X

## **Comparison of Some Blood Parameters and Vitamin D3 for Patients with Pyelonephritis and Renal Failure in Najaf Governorate, Iraq**

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### **Abstract**

The aim of the study is to compare pyelonephritis patients and renal-kidney-failure patients in terms of hemoglobin, white blood cells, platelets, glucose, urea, creatinine, in addition to vitamin D3, for (males and females) and of different ages (10 to 84 years) in the Najaf Governorate in Iraq for the period from April 2023 to October 2023, 168

blood samples were collected from patients, 77 (45.83%) for patients with pyelonephritis and 91 (54.17%) for patients with renal failure, in addition to 30 control samples. The results showed that there were significant differences at P Value of 0.05 and for all criteria studied in the research. There were no significant difference in age and gender.

**Keywords:** Kidney, Pyelonephritis, Renal Failure

### **1. Introduction**

**Kidneys** are dynamic organs and represent the major control system that maintains hemostasis in the body; they are affected by many chemicals and drugs that may affect their function. Changes in renal function are among the most prevalent forms of extreme disease [1] and play a significant roles include filtration, reabsorption, secretion, excretion, control, and development. Fluid is filtered and reabsorption prevents substantial substances (e.g. proteins, smaller organic molecules and salts) from being lost [2]. **Pyelonephritis** is an inflammation caused by bacteria that primarily effects the interstitial area and the renal pelvis or, less often, the renal tubules. It is one of the most common renal diseases [3], It is one of the most common renal diseases, pyelonephritis cases are classified to acute and chronic [4]. **Renal failure** is the most important disease that causes losing in the efficiency of kidney and is renal failure or may called end stage kidney disease where capacity for kidney become 15% less than the normal levels [5]. This disease can be classified into two types: first (acute kidney failure) which may resolve and it rapidly developed. Second (chronic kidney failure): It slowly developed and may become a permanent condition Symptoms of Renal failure include vomiting; swelling in the legs; a loss of appetite; confusion and tiredness [6].

### **2. Methods**

**2.1 Ethical Consideration:** It was approved by the Institutional Ethics Committees of the College of Science at the University of Kufa.

**2.2 Total Patients:** Between April 2023 and October 2023, 168 blood samples were collected from males and females who were admitted to hospitals in Najaf, Iraq, for treatment of pyelonephritis. They were divided samples into 77 pyelonephritis type and 91 renal failure type and 30 control helthy type. (All patients were diagnosed by doctors specializing in nephrology).

**2.3 Blood Collection:** Venous blood sample were obtained for hematological and biochemical screening tests after fasting. Five ml venous blood was collected from each subject and controls. The collected blood was divided almost equally (2.5 ml) put in K3-EDTA tubes was used to perform hematological profile, while other (2.5 ml) put in serum tubes which contain of gel, these tube was centrifuged 3000 rpm for 5 minutes to separate the serum used to perform biochemical tests [7].

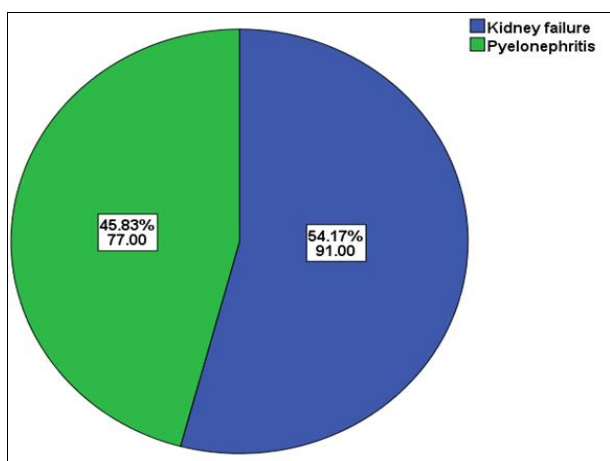
**2.4 Statistical Analysis:** Statistics were analyzed using the computer program IBM SPSS Statistics 21 for numbers and percentages.

**3. Results**

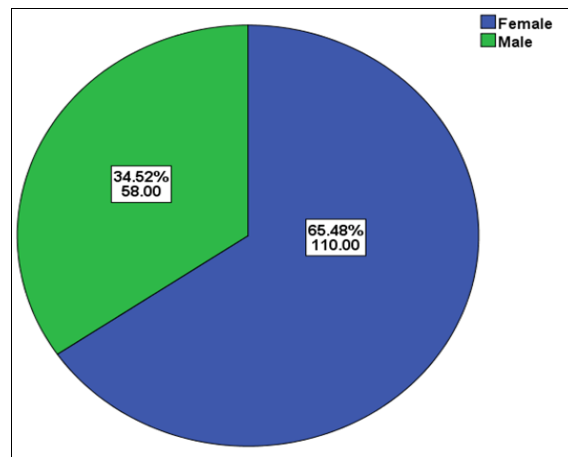
**Type of Kidney diseases:** 168 blood samples were collected from patients. The number of samples from patients with renal failure was 91 (54.17%), while the number of samples from patients with pyelonephritis was 77 (45.83%). (Fig 1).

**Gender:** The number of female samples were 110 (65.48%) and males were samples 58 (34.52%), distributed among kidney infection patients, 31 females (18.45%) and 27 males (10.07%), while kidney failure patients were 60 females (35.17%) and 50 males (29.76%). (Figure 2A & 2B).

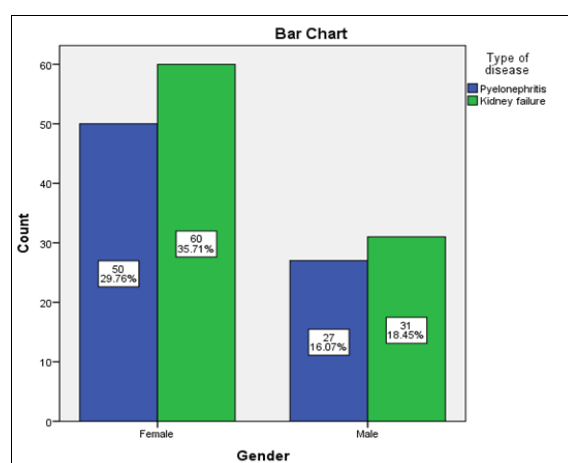
**Age:** The results showed that the average age of patients with pyelonephritis was (46.79 years), and the category (61-90) was the largest with 25 samples, followed by (31-60) with 41 samples, and finally (10-30) with only 11 samples. As for the average age for renal failure age is (50.93 years), and the category (60-30) was the largest with 60 samples, followed by (91-61) with 21 samples, and finally (10-30) with only 10 samples. (Table 1). As for the results of **blood parameters**, they are shown in Table 2, which indicate an average increase in hemoglobin, white blood cells, platelets, glucose, and vitamin D3. As for urea and creatinine, they were low for patients with pyelonephritis compared to patients with renal failure, but when compared with healthy people, we note that hemoglobin, white blood cells, and platelets Blood pressure and urea were within the normal range for patients with kidney infection, while glucose and creatine were high. While in patients with renal failure, white blood cells, platelets, and glucose were within the normal range, while hemoglobin and vitamin D3 were affected by a decrease, while urea and creatinine were high. The relationship between the type of disease, whether it was pyelonephritis or renal failure, with the variables of the study indicated that there was no significant difference with respect to gender and age, at 0.89 and 0.12, respectively, while the other criteria were significant, as shown in (Table 3).



**Fig 1:** Numbers and percentages of patients infected with pyelonephritis and renal failure in Al-Najaf Governorate, Iraq



**Fig 2(A):** Numbers and percentages of patients infected with pyelonephritis and renal failure in Al-Najaf Governorate, Iraq, according to gender



**Fig 2(B):** Numbers and percentages of patients infected with pyelonephritis and renal failure in Al-Najaf Governorate, Iraq, according to gender

**Table 1:** Numbers and percentages of patients infected with pyelonephritis and renal failure in Al-Najaf Governorate, Iraq, according to age

Type of disease	N	Age \ year		
		Mean	Minimum	Maximum
Pyelonephritis	77	46.97	18	73
Renal failure	91	50.93	10	84
Type of disease		Age year		
		(10-30)	(31-60)	(61-90)
Pyelonephritis	Count	11	41	25
	% within Age	52.4%	40.6%	54.3%
	% of Total	6.5%	24.4%	14.9%
Renal failure	Count	10	60	21
	% within Age	47.6%	59.4%	45.7%
	% of Total	6.0%	35.7%	12.5%
Total	Count	21	101	46
	% of Total	12.5%	60.1%	27.4%

**Table 2:** Comparison of laboratory parameters between cases with with pyelonephritis and kidney failure and healthy in Al-Najaf Governorate, Iraq

Type of disease	HB	WBC	Plate	RBS	Urea	Creatinine	VitD3	
Pyelonephritis	Mean	12.5870	8.5338	281.7403	183.7403	39.2061	1.9155	21.2779
	N	77	77	77	77	77	77	77
	Minimum	5.90	3.00	36.00	64.00	14.50	.30	7.00
	Maximum	17.50	24.00	671.00	858.00	159.30	14.00	53.00
	Std. Deviation	2.41325	3.75362	95.93822	142.87392	26.63595	2.57284	7.97812
Kidney failure	Mean	9.4615	6.3429	188.5571	105.8022	141.0879	9.5978	15.3736
	N	91	91	91	91	91	91	91
	Minimum	4.70	3.10	28.70	60.00	25.00	1.50	6.00
	Maximum	15.70	21.60	415.00	232.00	228.00	16.00	35.00
	Std. Deviation	2.07481	2.62374	82.07410	28.67334	40.01934	2.84843	6.77073
Normal healthy	Mean	19.51	7.35	350.27	141.52	42.39	1.08	65.18
	N	30	30	30	30	30	30	30
	Minimum	10.00	4.00	150.00	78.00	20.00	0.50	30.00
	Maximum	17.00	11.00	400.00	123.00	45.00	1.50	100.00
	Std. Deviation	2.07481	2.62374	82.07410	28.67334	40.01934	2.84843	6.77073

**Table 3:** Correlation between patients infected with pyelonephritis and kidney failure with parameters studies in Al-Najaf Governorate, Iraq

	Sum of Squares	df	Mean Square	F	Sig.
Gender With Type of disease	.004	1	0.00	0.02	0.89
Age \ year With Type of disease	654.067	1	654.07	2.42	0.12
HB With Type of disease	407.432	1	407.43	81.48	0.00*
WBC With Type of disease	200.203	1	200.20	19.66	0.00*
Plate With Type of disease	362157.349	1	362157.35	46.04	0.00*
RBS With Type of disease	253350.660	1	253350.66	25.87	0.00*
Urea With Type of disease	432928.448	1	432928.45	362.85	0.00*
Creatinine With Type of disease	2461.562	1	2461.56	331.32	0.00*
VitD3 With Type of disease	1453.982	1	1453.98	26.93	0.00*

#### 4. Discussion

Kidney diseases are widespread and on the rise in Najaf Governorate, especially patients with kidney failure. This is what [3] confirmed. The reason may be due to not seeing doctors when feeling the onset of symptoms related to kidney disease, or due to bad habits that damage the kidneys, or due to the accumulation of chronic diseases such as high blood pressure and diabetes [8]. The percentage of females was This is prevalent due to the physiological and hormonal composition of females and ages [9]. The age group (10-30 years) was the least affected by the infection because people at these ages have a more efficient immune system and do not accumulate the effects of other diseases. Unlike people older than 30, they are more susceptible due to the age of the cells, the death of some of them, or the weakness of the system. Immune system [10]. As for the blood criteria targeted in the study, which is hemoglobin, which gives an indicator of anemia, patients with kidney failure suffered from a deficiency in hemoglobin, the reason is abstaining from some necessary foods, and thus he suffers from anemia or patients may be associated with impaired kidney function have disorder of erythropoietin (EPO) syntheses in bone marrow thus anemia, which was a hormone released from kidney acts on erythroid progenitor cells in bone marrow regulating iron metabolism and differentiation lead to increased production of RBC [11]. The values and average of white blood cells were within the normal range, and this indicates the disease of kidney failure. It is rarely related to a specific infection, but rather it is a functional or structural disease [12]. And the platelets were also normal because they are linked to diseases of the blood and bone marrow, and the kidneys have no role in their formation or destruction [13]. The level of glucose in the

blood in this study was normal for patients with kidney failure, in contrast to studies [14, 15], which indicated an increase in the level of sugar. The reason may be due to the difference in the population or the difference in the number of samples studied. As for patients with pyelonephritis, the blood sugar result indicates an increase, and this is what makes the environment of the device Polycarbonate medium is suitable for the growth of many bacteria, especially glucose fermenters. This increase in urea and creatinine level occurs because the kidney loses its ability to eliminate nitrogenous wastes from the blood results in accumulation of these substances in the blood Creatinine is a resultant of muscle metabolism and its elevated level in blood indicates kidney disease [16]. vitamin D3 plays a crucial role in enhancing the innate immunity and potentiating antimicrobial actions against different organisms, such as bacteria, viruses and fungi [17]. Patients with advanced kidney disease usually take a drug containing vitamin D3 to reduce high levels of parathyroid hormone in the neck, which controls calcium metabolism. A significant increase in this hormone may weaken bones [18]. The cause of vitamin D3 deficiency may be due to a defect in the nephron, which works on excreting it, and not benefiting from it, as it is excreted with the blood during the hemodialysis process for renal failure.

#### 5. Conclusion

Through the results, it became clear that the percentage of people suffering from kidney failure is greater than those suffering from pyelonephritis, and the percentage of females predominates for both types, and the age group (10-30) years is the least susceptible to kidney disease. Platelets and white blood cells were within the normal range for

pyelonephritis and renal failure. Also, vitamin D3 deficiency can be an indicator of kidney disease.

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