

# The prevalence study of patients infected with pyelonephritis by in Al-Najaf Governorate, Iraq

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**Abstract.** The study aimed at the prevalence of pyelonephritis and its association with some kidney diseases, function or structure, in Iraq, specifically in the province of Najaf, for a period of 16 months, from 2/1/2022 to 1/5/2023, where 1255 samples of males and females of different ages were collected, and the patients were divided into several groups depending on time, gender, residence, age and disease. Regarding the disease, there are individuals who only have pyelonephritis and their number was 277 (18%), while the rest of the patients were 1028 (82%) who had kidney problems, whether functional or immunological, which is kidney failure and renal syndrome, kidney transplantation and lupus erythematosus. The most common is pyelonephritis associated with renal failure or insufficiency, with a number of 768. (Also, the results showed that the month of April for the year 2022 obtained the most samples, with a number of 109 (8.69%) samples. with regard to gender, females were generally more susceptible to infection than males, reaching 55%. As for housing, most patients lived in urban areas. In contrast to rural areas, where their percentage was low (40%), and therefore people should be educated and urged to review the hospital and specialist doctors when they feel any symptoms related to the kidneys, so that they do not suffer from failure later.

## 1 Introduction

Pyelonephritis is a serious kidney infection that requires prompt medical intervention. Failure to diagnose and treat pyelonephritis promptly can lead to complications such as sepsis, kidney damage, and even death. Pyelonephritis can occur as a complication in 0.3-0.5% of lower urinary tract infections [1, 2].

Although the incidence of pyelonephritis is relatively low, it is important to be aware of its potential occurrence, particularly in patients with lower urinary tract infections. In patients treated with alternative treatment options, higher rates of pyelonephritis have been reported compared to those treated with antibiotics [3, 4]. However, a retrospective long-term follow-

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up analysis has shown that non-antibiotic treatment does not have a negative impact on the development of pyelonephritis. Furthermore, pyelonephritis is the most common infectious complication of pregnancy. Although the incidence of asymptomatic bacteriuria is not increased in pregnancy, there is a higher likelihood of ascending infection and pyelonephritis [5, 6]. Pyelonephritis is an inflammation caused by bacteria that primarily affects the interstitial area and the renal pelvis or, less often, the renal tubules. It is one of the most common renal diseases, pyelonephritis cases are classified to acute and chronic [7].

To diagnose pyelonephritis, physicians must rely on evidence of UTI from urinalysis and culture, along with signs and symptoms suggesting upper UTI (fever, chills, flank pain, nausea, vomiting, and costovertebral angle tenderness [8]. Infecting bacteria that cause pyelonephritis usually are normal intestinal and fecal flora that grows readily in urine. Uropathogens express common virulence factors that enable them to infection, it remains contained within this tract unless predisposing conditions exist [9]. The most common causative organism is *Escherichia coli*, but *Proteus*, *Pseudomonas*, *Staphylococcus aureus* and *Enterococcus faecalis* (formerly *Streptococcus faecalis*) may also cause this infection [10], other gram-negative rods including *Klebsiella spp* and *Enterobacter spp*. which also causes pyelonephritis [11]. As well as, Mycoplasma and Chlamydia have a role in the etiology of the disease [12].

## **2 Materials and Methods**

### **2.1 Ethical Consideration**

It was approved by the Institutional Ethics Committees of the College of Science at the University of Kufa and the Scientific Committee for Research in the Health Department of Najaf [13, 14].

### **2.2 Patients**

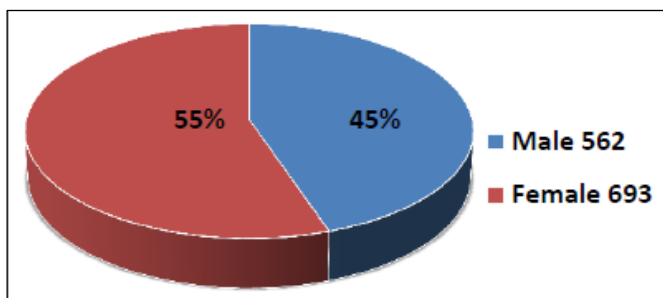
This study was conducted in Al-Najaf Governorate, Iraq. During the period from January 2022 to May 2023, total of (1255) patients (male and female) with pyelonephritis, aged from 12 to 86 years, living in urban and rural areas, were included. All patients were diagnosed by doctors specializing in nephrology through clinical and laboratory symptoms, in addition to an ultrasound examination.

### **2.3 Statistical analysis**

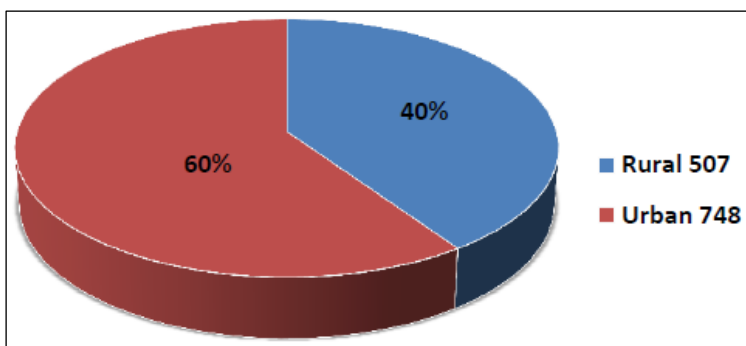
Statistical analysis was done according to percentages to compare between samples using SPSS V.9 computer software [15, 16].

## **3 Results**

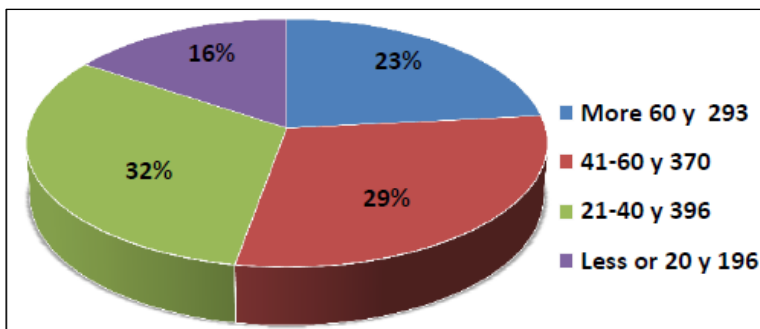
Of the 1255 pyelonephritis patients, 562 (45%) were male and 693 (55%) were female (Figure 1). According to the area of incidence, the results showed that there were 507 patients (40%) living in rural areas and 748 patients (60%) living in urban areas (Figure 2). The age group 21-40 years was the most prevalent (396 patients, 23%) (Figure 3), the number of patients who had only pyelonephritis 277 (18%) and (82%) had pyelonephritis with kidney diseases Others (Figure 4), and among this group, pyelonephritis with kidney diseases, the number of patients with renal failure was the largest, by 768 (52%) (Figure5). From tables 1,2 and 3 a profile of 1255 patients with pyelonephritis was mentioned.



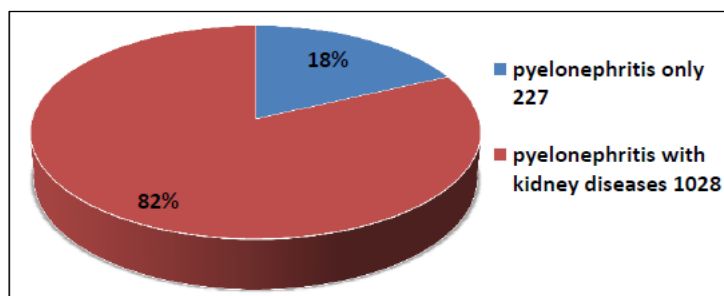
**Fig. 1.** Numbers and percentages of patients infected with pyelonephritis in Al-Najaf Governorate, Iraq, during the period from January 2022 to May 2023 according to gender. N=1255 patients.



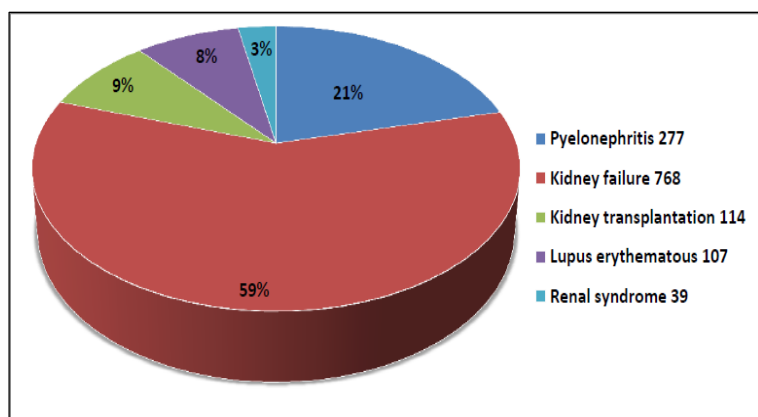
**Fig. 2.** Distribution of patients infected with pyelonephritis in AL-Najaf Governorate, Iraq, during the period from January 2022 to May 2023 according to areas of residence. N=1255 patients.



**Fig. 3.** Distribution of patients infected with pyelonephritis in AL-Najaf Governorate, during the period from January 2022 to May 2023 according to age of residence. N=1255 patients.



**Fig. 4.** Distribution of patients infected pyelonephritis only and pyelonephritis with kidney diseases in AL-Najaf Governorate, during the period from January 2022 to May 2023 according to of residence. N=1255 patients.



**Fig. 5.** Distribution of patients infected with kidney diseases in AL-Najaf Governorate, during the period from January 2022 to May 2023 according to of residence. N=1255 patients.

**Table1.** Profile of 1255 patients infected with pyelonephritis in AL-Najaf Governorate, during the period from January 2022 to May 2023.

Year-Month	Only Pyelonephritis		With Kidney failure		With Kidney ransplantation		With Lupus erythematosus		With Renal syndrome		Total	100%
	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male	Male	Fe-male		
22-Jan	13	6	12	17	5	1	2	10	2	1	69	5.50
22-Feb	7	5	32	4	9	4	1	9	0	1	72	5.74
22-Mar	2	4	24	11	5	11	2	3	0	0	62	4.94
22-Apr	5	3	17	66	4	1	5	3	2	3	109	8.69
22-May	4	13	28	16	5	4	0	6	0	3	79	6.29
22-Jun	2	10	21	8	6	0	2	5	0	3	57	4.54
22-Jul	0	8	31	8	3	2	0	10	1	1	64	5.10
22-Aug	3	7	17	11	5	6	4	3	1	0	57	4.54
22-Sep	1	5	12	26	3	5	4	0	2	0	58	4.62
22-Oct	9	3	37	35	5	2	3	0	0	4	98	7.81

22-Nov	9	14	19	21	0	5	3	7	1	0	79	6.29
22-Dec	2	6	15	26	8	2	2	3	4	1	69	5.50
23-Jan	4	13	30	36	4	2	2	0	0	0	91	7.25
23-Feb	7	13	23	50	0	2	1	1	4	1	102	8.13
23-Mar	12	17	29	24	1	1	0	3	0	3	90	7.17
23-Apr	3	17	15	47	2	1	3	10	1	0	99	7.89
Total	83	144	362	406	65	49	34	73	18	21	1255	100
100%	6.61	11.47	28.84	32.35	5.18	3.90	2.71	5.82	1.43	1.67	100	

**Table 2.** Profile of 1255 patients infected with pyelonephritis in AL-Najaf Governorate, during the period from January 2022 to May 2023 according to areas of residence.

patients infected pyelonephritis	Urban		Rural		Total	100%
	Female	Male	Female	Male		
Only Pyelonephritis	87	45	57	38	227	18.09
With Kidney failure	244	219	162	143	768	61.20
With Kidney transplantation	28	40	21	25	114	9.08
With Lupus erythematosus	41	18	32	16	107	8.53
With Renal syndrome	13	13	8	5	39	3.11
Total	413	335	280	227	1255	100
100%	32.91	26.69	22.31	18.09	100	

**Table 3.** Distribution of patients infected with pyelonephritis in in AL-Najaf Governorate, Iraq during the period from January 2022 to May 2023 according to of residence. N=1255 patients.

Age/ Year	Only Pyelonephritis		With Kidney failure		With Kidney transplantation		With Lupus erythematosus		With Renal syndrome		Total	100%
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male		
Less 20	26	14	67	51	3	5	16	2	2	10	196	15.62
21-40	41	31	91	94	28	26	43	29	10	3	396	31.55
41-60	38	17	138	116	16	28	4	2	9	2	370	29.48
More 60	39	21	110	101	2	6	10	1	0	3	293	23.35
Total	144	83	406	362	49	65	73	34	21	18	1255	100
100%	11.47	6.61	32.35	28.84	3.90	5.18	5.82	2.71	1.67	1.43	100	

## 4 Discussion

Through the results, it became clear that Pyelonephritis affects all age groups, males and females, and is prevalent in both urban and rural residents [17] and is not related to a specific period of time in Najaf Governorate. However, the percentage of patients in the months of April, March and February is the most, and the reason may be due to the nature of the weather (spring), so the influx of patients is continuous during the day, while the months of May,

June, July and August are hot (summer) [18] and therefore, at 12 noon or less, the influx of patients stops except for rare and also in (winter). So the patient review begins at nine or ten o'clock, while the rest of the months are approximately eight o'clock. As for gender, females are more susceptible to disease than males, and this is due to the large number of urinary infections in females, which are caused by the proximity of the anus to the urethral opening [19] while with regard to residential areas, the percentage of urban residents was more than rural, and this indicates that patients living in urban areas review and care about their health more than residents of rural areas who do not go to the hospital or only at the dangerous situation, and this was also concluded through this study, patients with kidney failure, most of whom are from the countryside, and the reason is due to lack of medical awareness [20] or their preoccupation with work and distance sometimes. Through Table 1, we note that the age group (less than 20 years) is the least affected by pyelonephritis diseases, since this stage is the body's immunity is good [21], and the infection here may be limited to the ureter and bladder and has not reached the kidney [22]. In addition to this stage, the doctor rarely consults alone, and therefore he is associated with another person for review, unlike the age group from (21 to 40 years) who is self-reliant and interested in his health, and the percentage of infection is also high in this category, females are more due to the change of hormones every month during the menstrual cycle or pregnancy and lactation, which play a role in immunity and the occurrence of infection, [23] except for the percentage of disease association with kidney transplantation in males more than in women, which may be due to the fact that the eastern society, including Iraq, is a male society, and therefore families may be paying attention to males and resorting to kidney transplantation for them in case of kidney failure, unlike females, who most of them remain suffering from kidney failure and continue on hemodialysis. The least affecting diseases with nephritis are immunological diseases,[24] whether it is lupus that affects the organ of the kidney or renal syndrome, while kidney failure diseases are associated with a great correlation With kidney infections, which constitute the largest percentage among patients compared to other diseases, even with pyelonephritis alone, because patients with failure often have other diseases that affect the kidney and are more susceptible to bacteria, or because of the transmission of bacterial infection through connecting hemodialysis devices or urine catheters [25]. Therefore, we need more health awareness and health care programs regarding kidney disease and urging them to frequent visits to the doctor, especially in rural areas, to prevent kidney failure.

## 5 Conclusion

In Iraq - Najaf Governorate - Pyelonephritis infections are more common in patients who suffer from kidney failure compared to other kidney diseases, and in females more than males. As for the age group, it ranges between 21-40 years, and in terms of the nature of housing, rural areas are the least reviewed. To the doctor when suffering from kidney disease. Therefore, health awareness must be raised, and the health of the kidney should be taken care of, and a specialist doctor should be consulted when there are any symptoms of kidney disease, for all age groups and in various circumstances, in order to preserve a healthy kidney free of diseases.

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